CHAPTER 48. ARIZONA UNIFORM PLUMBING CODE COMMISSION

ARTICLE 1. CHAPTERS

Section

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ARTICLE 1. ~~ARIZONA UNIFORM PLUMBING CODE~~ CHAPTERS

R4-48-101. Chapter 2, Definitions

A. The following definition applies in this Article: "Person" has the meaning set forth in A.R.S. § 1-215.

B. The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Sec~~.~~ 203.0 Add a definition for "Air Admittance Valve" which reads:

   Air Admittance Valve means a one-way valve designed to allow air to enter the plumbing drainage system when negative pressure develops in the piping system.

2. Sec. 211.0. Modify the definition of "Insanitary" by replacing numbered paragraphs (2) and (3) with the following:

   (2) Any opening in a drainage system, except where lawful, which is not provided with an approved liquid sealed trap.

(3) Any plumbing fixture or other waste discharging receptacle or device, which is not supplied with water sufficient to flush it and maintain it in a clean condition except those specifically designed to function without water.

R4-48-102. Incorporation of the Uniform Plumbing Code by Reference

A. All persons shall comply with the International Association of Plumbing and Mechanical Officials' (I.A.P.M.O.) Uniform Plumbing Code (2003 Edition) which is incorporated by reference, including appendices A, B, D, E, G, H, J, K, and L, and installation standards, as the state plumbing code. This incorporation by reference does not include any later amendments or editions. Copies of the incorporated material are available from I.A.P.M.O 5001 E. Philadelphia Street, Ontario, CA 91761-2816 and are on file with Arizona Uniform Plumbing Code Commission

B. The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

Delete pages: one through ~~14~~ 10, after making all modifications in this Article.

R4-48-103. Chapter 3, General Regulations

A. The rules of this Article are adopted under A.R.S. § 41-619, which provides for the adoption statewide of the Uniform Plumbing Code ("Code"). The rules do not specify the procedures by which the Code will be enforced, which may be governed by other provisions of state law. The rules do not supersede, restrict, or negate the authority of any state agency, municipality, or county to administer, delegate, or enforce laws, statutes, rules, or ordinances within its respective jurisdiction.

B. The Uniform Plumbing Code incorporated in R4-48-102(A), is modified as follows:

1. Move Sec. 101.4.1.3 to a new Sec. 301.1.5.
2. Move Sec. 101.5.2 to a new Sec. 301.1.6.
3. Move Sec. 101.5.4 to a new Sec. 301.1.7.
4. Move Sec. 101.5.5 to a new Sec. 301.1.8.
5. Move Sec. 103.5 to a new Sec. 321.0.
6. Move Sec. 103.5.1 to a new Sec. 321.1.
7. Move Sec. 103.5.1.2 to a new Sec. 321.2.

8. Move Sec. 103.5.1.3 to a new Sec. 321.3.

9. Move Sec. 103.5.1.4 to a new Sec. 321.4.

10. Move Sec. 103.5.5 to a new Sec. 321.5.

11. Move Sec. 103.5.5.1 to a new Sec. 321.5.1.

12. Move Sec. 103.5.5.2 to a new Sec. 321.5.2.

13. Move Sec. 103.5.3 to a new Sec. 322.0.

14. Move Sec. 103.5.3.1 to a new Sec. 322.1.

15. Move Sec. 103.5.3.2 to a new Sec. 322.2.

16. Move Sec. 103.5.3.3 to a new Sec. 322.3.

17. Move Sec. 103.5.3.5 to a new Sec. 322.4.

18. Move Sec. 103.5.6.1 to a new Sec. 322.5.

19. Move Sec. 103.5.6.2 to a new Sec. 322.6.

20. Move Sec. 103.5.6.3 to a new Sec. 322.7.

21. Move Sec. 103.6 to a new Sec. 323.0.

22. Move Sec. 103.6.1 to a new Sec. 323.1.

23. Move Sec. 103.6.2 to a new Sec. 323.2.

24. Move Sec. 103.6.3 to a new Sec. 323.3.

R4-48-104. Chapter 4, Plumbing Fixtures and Fixture Fittings

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Sec. 402.1 is modified to read: "The maximum flow rates and quantities for all plumbing fixtures and fixture fittings shall be consistent with A.R.S. Title 45, Chapter 1, Article 12.
2. Sec. 402.2 is deleted.

3. Sec. 413.0 is modified to read: Those jurisdictions which have not adopted a building code which stipulates minimum plumbing facilities shall utilize Table 4-1 of the 2003 UPC when establishing plumbing facility requirements.

R4-48-105. Chapter 5, Water Heaters

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Sec. 501.0 is modified to read: General. The regulations of this chapter shall govern the construction, location, and installation of all fuel-burning and other water heaters heating potable water, together with all chimneys, vents, and their connectors. All design, construction, and workmanship shall be in conformity with accepted engineering practices and shall be of such character as to secure the results sought to be obtained by this Code. No water heater shall be hereinafter installed which does not comply in all respects with the type and model of each size thereof approved by the Authority Having Jurisdiction. A list of generally accepted gas equipment standards is included in Table 14-1. A water heater (boiler) which exceeds any of the following limitations shall not be placed in service until the vessel is separately inspected pursuant to A.R.S. Title 23, Chapter 2, Article 11.

   (a) 120-gallon (454.2L) nominal water capacity.

   (b) 160 PSI (1,103.2 kPa) operating pressure.

   (c) 210° F (98.9° C) operating temperature.

   (d) 200,000 btu/h (58,620W) heat input.

2. Sec. 505.1 is modified to read: Water heater installations in bedrooms and bathrooms shall comply with one of the following:

   (1) Water heater shall be installed in a closet equipped with a weather-stripped door with a self-closing device, and all combustion air shall be obtained from the outdoors in accordance with Section 507.0.

   (2) Water heater shall be of the direct-vent type.

R4-48-106. Chapter 6, Water Supply and Distribution

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Sec. 601.1. Add exception to read:

   Potable running water is not required for waterless urinals that have been approved by the Authority Having Jurisdiction.

2. Sec. 603.4 is added to read:

   Secondary Backflow Protection. The following occupancies shall have Reduced Pressure Principle Backflow Prevention Assemblies installed as near as practical to the water service meter connection: Hospitals, surgical clinics, laboratories, morgues, mortuaries, veterinary hospitals, industrial occupancies, packing plants, slaughter houses, chemical plants, municipal waste treatment facilities, and construction water services. NOTE: Multiple water services which are interconnected onsite shall be provided with not less than a Double Check Valve Assembly at each service connection.

~~7~~.3. Move Sec. 103.5.1.1 to a new Sec. ~~610.15~~ 609.4.1.

~~8~~.4. Move Sec. 103.5.3.3 to a new Sec. ~~610.16~~ 609.4.2.

R4-48-107. Chapter 7, Sanitary Drainage

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Section 701.1.2 is deleted.

2. Sec. 707.4 is modified to read: Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal and each run of piping, which is more than 100’ ~~feet~~ (30.4 m) in total developed length, shall be provided with a cleanout for each 100’ ~~feet~~ (30.4 m), or fraction thereof, in length of such piping.

   Exceptions:

   (a) Cleanouts may be omitted on a horizontal drain line less than 5’ (1.5 m) in length unless such line is serving sinks or urinals.

(b) Cleanouts may be omitted on any horizontal drainage pipe installed on a slope of 72° or less from the vertical angle (angle of 1/5 bend).

(c) An approved type of two-way cleanout fitting, installed inside the building wall near the connection between the building drain and building sewer or installed outside of a building at the lower end of a building drain and extended to grade, may be substituted for an upper terminal cleanout.

3. Sec. 710.6, paragraph 1, is modified to read: Backwater valves, gate valves, motors, compressors, air tanks, and other mechanical devices required by this section shall be located where they will be accessible for inspection and repair at all times.

4. Sec. 713.4 is modified to read: The public sewer may be considered as not being available only when so determined by the Authority Having Jurisdiction.

~~6.~~5. Sec. 723.0 is modified to read: ~~"~~Building sewers shall be tested by plugging the end of the building sewer at its points of connection with the public sewer or private sewage disposal system and completely filling the building sewer with water from the lowest to the highest point thereof or by approved equivalent low pressure air test, or by such other test as may be prescribed by the Authority Having Jurisdiction. The building sewer shall be watertight at all points. Exception: Sewer tests may be waived at the discretion of the Authority Having Jurisdiction.

R4-48-108. Chapter 8, Indirect Wastes

This chapter has no modifications.

R4-48-109. Chapter 9, Vents

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Sec. 903.1.2 is deleted.

2. Sec. 909.0 is modified to read:

Special Venting

909.1 Air Admittance Valve

909.1.1 Vent systems utilizing air admittance valves shall comply with this section. Individual and branch-type air admittance valves shall conform to ASSE Standard 1051, which is incorporated by this reference and published by the American Society of Sanitary Engineering for Plumbing and Sanitary Research, 28901 Clemens Rd., Ste. 100, Westlake, OH 44145. This incorporation by reference does not include any later amendments or editions. This device shall close by gravity and seal the vent terminal at zero differential pressure (no flow condition) and under positive internal pressure. The air admittance valve provides a method of allowing air to enter the plumbing drainage system without the use of a vent extending to the open air and prevents sewer gases from escaping into the building.

909.1.2 The valves shall be installed in accordance with this section and the manufacturer's installation instructions. Air admittance valves shall be installed after the drain, waste, and vent testing required by Sections 712.2 or 712.3 has been approved by the Authority Having Jurisdiction.

909.1.3 Individual and branch vents shall be permitted to terminate with a connection to the air admittance valve. The air admittance valve shall only be permitted to vent fixtures on the same floor, which connect to a building drain.

909.1.4 The air admittance valve shall be located at least 4" (102 mm) above the horizontal branch drain, or fixture drain being vented, within the maximum developed length permitted for the vent, and shall terminate at least 6" (152 mm) above insulation materials.

909.1.5 The air admittance valve shall be accessible for the purpose of maintenance or replacement. The valve shall be located within a space that allows air to enter the valve.

909.1.6 The air admittance valve shall be rated for the size of the vent to which it is connected.

909.1.7 Within each plumbing system utilizing air admittance valves, a minimum of one vent stack shall extend outdoors to the atmosphere.

909.1.8 Air admittance valves shall not be installed in special waste systems, as described in Chapter 8, nor in spaces used as supply or return air plenums.

909.2 Island Fixtures

Traps for island sinks and similar equipment shall be roughed in above the floor and may be vented by extending the vent as high as possible, but not less than the drainboard height and then returning it downward and connecting it to the horizontal sink drain immediately downstream from the vertical fixture drain. The return vent shall be connected to the horizontal drain through a wye-branch fitting and shall, in addition, be provided with a foot vent taken off the vertical fixture vent by means of a wye-branch immediately below the floor and extending to the nearest partition and then through the roof to the open air or may be connected to other vents at a point not less than 6" (152.4 mm) above the flood level rim of the fixtures served. Drainage fittings shall be used on all parts of the vent below the floor level and a minimum slope of 1/4" per foot (21-mm/m) back to the drain shall be maintained. The return bend used under the drainboard shall be a one piece fitting or an assembly of a 45°, a 90°, and a 45° elbow in the order named. Pipe sizing shall be as elsewhere required in this Code.

R4-48-110. Chapter 10, Traps and Interceptors

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Sec. 1005.0 is modified to read: Trap Seals. Each fixture trap shall have a liquid seal of not less than 2” (50.8mm) and not more than 4” (101.6mm) except where a deeper seal is found necessary by the Authority Having Jurisdiction for special conditions. Traps shall be set true with respect to their liquid seals and, where necessary, they shall be protected from freezing.
2. Sec. 1007.0 is modified to read: Trap Seal Protection. Floor drain or similar traps directly connected to the drainage system and subject to infrequent use shall be provided with an approved means of maintaining their water seals, except where not deemed necessary for safety

or sanitation by the Authority Having Jurisdiction. When automatic trap priming devices are installed, they shall be accessible for maintenance.

3. Sec. 1007.1 is added to read: Approved Means of Maintaining Trap Seals. Approved means of maintaining trap seals include the following, but are not limited to the methods cited:

   (a) Listed Trap Seal Primer.

   (b) A hose bibb or bibbs within the room.

   (c) Drainage from untrapped lavatories discharging to the tailpiece of those fixture traps which require priming. All fixtures shall be in the same room and on the same floor level as the trap primer.

R4-48-111. Chapter 11, Storm Drainage

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Sec. 1101.3 is modified to read: Rainwater piping placed within the interior of a building or run within a vent or shaft shall be of cast iron, galvanized steel, wrought iron, brass, copper, lead, Schedule 40 ABS DWV, Schedule 40 PVC DWV, or other approved materials, and changes in direction shall conform to the requirements of Section 706.0. Except for single family dwelling units, materials exposed within ducts or plenums shall have a flame-spread index of not more than 25 and a smoke-developed index of not more than 50, when tested in accordance with the Test for Surface Burning Characteristics of the Building Materials (See the Building Code standards based on ASTM E-84 and ANSI/UL 723.).
2. Sec. 1101.11.2.2 is modified to read: Where secondary roof drainage is provided by means of roof drains or standpipes, the secondary system shall be separate from the primary system and shall discharge independently at grade, in a location which would normally be observed by the building occupants or maintenance personnel.
3. Sec. 1101.11.2.4 is modified to read: Scuppers shall be sized as rectangular weirs, using hydraulic principles to determine the required length and resulting overflow head or a minimum of three times the area of the roof drain required according to Table 11-1.

4. Add a new Section 1102.3 Gutters, to read: Gutters and leaders placed on the outside of buildings, other than R-3, private garages, and buildings of Type V construction, shall be of noncombustible material or a minimum of schedule 40 plastic pipe.

5. Sec. 1106.2 is modified to read:

The size of building storm drains or building storm sewers or any of their horizontal branches shall be based upon the maximum projected roof or paved area to be handled and Table 11-2.

Exception: The potential head of water which may rise in the vertical drain pipe (tailpiece) may be used to reduce the horizontal pipe size and its slope if the head (rise) is sufficient when calculated as follows:

(a) If the head (`h') is equal to or greater than 3/8” for each foot (31.35 mm/m) of horizontal pipe length, the horizontal pipe may be pitched at 1/8” slope (10.45 mm/m), but sized according to the 1/2” slope (41.8 mm/m) table.

(b) If the head (`h') is equal to or greater than 1/8” for each foot (10.45 mm/m) of horizontal pipe length, the horizontal pipe may be pitched at 1/8” slope (10.45 mm/m), but sized according to the 1/4” slope (20.9 mm/m) table. (See Illustration A).

EXAMPLE #1: Roof Area - 4800 Square Feet (445.9 m 2)

Maximum Rainfall/Hour – 6” (152.4 mm/h)

Pipe Laid at 1/8” Slope (10.45 mm/m)

Using the 1/2” slope (41.8 mm/m) table, the horizontal pipe size will be 6”.

The available static head (`h') needed to allow use of the 1/2” (41.8 mm/m) table is calculated as follows:

Three-eighths inch of head pressure per foot (31.35 mm/m) of horizontal pipe run becomes Three-eighths inch x 100’ = 300/8ths, or `h' = 37-1/2” (952.5 mm). NOTE: Sizing from the 1/8” (10.45 mm per m) table would have required the horizontal pipe size to be 8” (203.2 mm), rather than the 6” (152.4 mm) made possible by use of the 1/2” (41.8 mm/m) slope table.

EXAMPLE #2: Roof Area - 6000 Square Feet

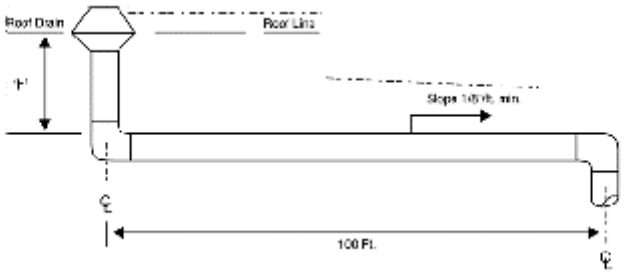
Maximum Rainfall/Hour – 6” (152.4 mm)

Pipe Laid at 1/8” Slope (10.45 mm/m)

Using the 1/4” slope (20.9 mm/m) table the horizontal pipe size will be 8” (203.3 mm). The available static head (`h') needed to allow use of the 1/4” (20.9 mm/m) table is calculated as follows: 1/8” of head pressure per foot (10.45 mm per m) of horizontal pipe run becomes 1/8” x 100’ = 100/8ths, or `h' = 12 1/2” (317.5 mm). NOTE: Sizing from 1/8” (10.45 mm per m) table would have required the horizontal pipe size to be 10” (254.0 mm) rather than the 8” (203.2 mm) made possible by use of the 1/4” slope (20.9 mm/m) table.

(c) If the head (`h') is equal to or greater than 10’ (3.05 m) (for example, base of a stack), all horizontal pipe downstream of any such vertical section may be the same size as the vertical pipe to which it is connected.

Illustration A. Horizontal Rainwater Piping



R4-48-112. Chapter 12, Fuel Piping

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

1. Equation 12-2, High Pressure Gas Formula is modified to read:

$$D=(Q^{0.381}/18.93) \times [(C_r \times L) /(P_1{}^2 – P_2{}^2) \times Y]^{0.206}$$

2. Delete Table 12-8 and Table 12-9. Use Equation 12-2 to size medium pressure natural gas piping at pressures other than 5.0 psig.

3. Delete Table 12-12. Use Equation 12-2 to size undiluted liquified petroleum gas piping at pressures greater than 1.5 psig.

R4-48-113. Chapter 13, Health Care Facilities and Medical Gas and Vacuum Systems

This chapter has no modifications.

R4-48-114. Chapter 14, Mandatory Referenced Standards

This chapter has no modifications.

R4-48-115. Chapter 15, Firestop Protection

This chapter has no modifications.

ARTICLE 2. APPENDICES

R4-48-201. Appendix A, Recommended Rules for Sizing the Water Supply System

This appendix has no modifications.

R4-48-202. Appendix B, Explanatory Notes on Combination Waste and Vent Systems

This appendix has no modifications.

R4-48-203. Reserved

R4-48-204. Appendix D, Sizing Stormwater Drainage Systems

This chapter has no modifications.

R4-48-205. Appendix E, Manufactured / Mobile Home Parks and Recreational Vehicle Parks

This appendix has no modifications.

R4-48-206. Reserved

R4-48-207. Appendix G, Graywater Systems for Single Family Dwellings

A. Appendix G of the International Association of Plumbing and Mechanical Officials' (I.A.P.M.O.) Uniform Plumbing Code (2003 Edition) is incorporated by reference. This incorporation by reference does not include any later amendments or editions. Copies of the incorporated material are available from I.A.P.M.O. at 5001 E. Philadelphia Street, Ontario, CA 91761-2816 and are on file with the Arizona Uniform Plumbing Code Commission. Notwithstanding any other provision of R4-48-125, the provisions of R4-48-125 do not require an Authority Having Jurisdiction to act in a manner that conflicts with other provisions of state law or duplicates any act required by other provisions of state law.

B. Appendix G, incorporated by subsection (A) is modified as follows:

1. Appendix G1(b) is modified to read: The type of system shall be determined on the basis of location, soil type, absorption rate, soil classification, and depth to ground water below the land surface, and shall be designed to accept only graywater connected to the system from the residential building. The system, except as otherwise approved, may consist of a holding tank or tanks and shall discharge graywater into subsurface irrigation/disposal fields.

2. Appendix G1(d) is modified to read: No permit for any graywater system shall be issued until a plot plan with appropriate data, as required by Section G4, has been submitted and approved. When there is insufficient lot area or inappropriate soil conditions for adequate absorption of the graywater, as determined by the Authority Having Jurisdiction, no graywater system shall be permitted. No permit shall be issued for the irrigation/disposal field of a graywater system that does not meet the criteria specified in this Appendix until appropriate data satisfactory to the Authority Having Jurisdiction have been submitted and approved.
3. Appendix G1(g) is added to read: When making the initial site investigation and determining the soil characterization and soil absorption rates for graywater systems, the standards in subsections (a) through (c) are incorporated by reference and the standards in subsections (a) through (d), or equivalent methods or standards approved by the Authority Having Jurisdiction shall be used. The incorporations do not include later amendments or editions and are available from Registrar of Contractors. and are on file with the Office of the Secretary of State:
   a. ASTM D-5879-95, Standard Practice for Surface Site Characterization for On-Site Septic Systems;
   b. ASTM D-5921-96, Standard Practice for Subsurface Site Characterization of Test Pits for On-Site Septic Systems;
   c. ASTM D-1452-80 (Reapproved 1995), Standard Practice for Soil Investigation and Sampling by Auger Borings," may be used in areas where the depth to groundwater may be within the required vertical separation from the bottom of the subsurface disposal field for graywater systems, based on the factors in the standard, or
   d. Percolation testing, as specified in Appendix I of this Code.
4. Appendix G2 is modified to read: Graywater is untreated household water which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes-washing machines and laundry tubs. It shall not include wastewater from kitchen sinks, dishwashers, or deleterious chemicals such as discharge from photo lab sinks.

5. Appendix G4(a) is modified to read: A site-specific plot plan drawn to scale completely dimensioned, showing lot lines and structures, direction and approximate slope of surface (2 foot (0.6 m) contour lines), location of all present or proposed retaining walls, drainage channels, water supply lines, wells, paved areas and structures on the lot, number of bedrooms and plumbing fixtures in each structure, location of private sewage disposal system and 100% expansion area, or building sewer connection to the public sewer, and location of the proposed graywater system.
6. Appendix G4(b) is modified to read: Details of construction, including system profile and construction sections necessary to assure compliance with the requirements of this Appendix, together with a full description of the complete installation, including installation methods, construction, and materials as required by the Authority Having Jurisdiction.
7. Appendix G4(c) is modified to read: A log of soil formations, percentage of rock, texture, structure, consistence, and mottles as provided in ASTM D-5921-96, depth to groundwater below the land surface as determined by test holes dug in close proximity to any proposed irrigated area (using, for example, published groundwater data, subdivision reports, or relevant well data), soil classification, or percolation test results to determine equivalent function of subsurface irrigation/disposal field. Other information acceptable to the Authority Having Jurisdiction may be used to obtain soil performance equivalent to that achieved by the standards or methods specified in Section G1(g).
8. Appendix G5(a)(1) is modified to read: All applicable provisions of this Appendix and the inspection requirements shall be complied with. The Authority Having Jurisdiction shall confirm the soil suitability for a graywater system, inspect the disposal area following excavation, and inspect the piping system installation.
9. Appendix G5(a)(3) is modified to read: Holding/surge tanks shall be installed on dry, level, well-compacted soil if underground, or on a level 3 inch (76.2 mm) concrete slab, if above ground.
10. Appendix G5(a)(4) is modified to read: Above ground holding/surge tanks of cylindrical design shall be anchored against overturning.

11. Appendix G5(b)(1) is modified to read: Holding/surge tanks shall be filled with water to the overflow line prior to and during inspection. All seams and joints shall be left exposed and the tank shall remain watertight.
12. Appendix G5(b)(2) is modified to read: A flow test shall be performed through the system to the point of graywater irrigation/disposal. All conveyance lines and components shall be watertight.
13. Appendix G7 is modified to read: Each irrigation zone shall have the minimum effective irrigation area in square feet as determined by Table G-2 for the type of soil found in the excavation, based upon a calculation of estimated graywater discharge pursuant to Section G-6 of this Appendix. The effective area of the irrigation/disposal zone shall be equal to the aggregate length of the perforated pipe sections within the irrigation zone times the width of the proposed irrigation/disposal zone. Each proposed graywater system shall include at least one irrigation zone. Each zone shall be in compliance with the provisions of this section. No excavation for an irrigation/disposal field shall extend to a depth where graywater may contaminate the groundwater or surface water. The minimum vertical separation distance from the bottom of the irrigation zone shall be at least 1’ (0.30 m) of normally unsaturated soil.
14. Appendix G8(a) is modified to read: Irrigation/disposal field size shall be computed from Table G-2. Rock fragments as defined by ASTM D-5921-96 shall be excluded from the field sizing.
15. Appendix G8(c) is modified to read: When a percolation test is used, no graywater system shall be permitted if the test shows the absorption capacity of the soil is outside the range of two minutes per inch (0.79 minutes per cm) to 60 minutes per inch (23.6 minutes per cm). Soils with excessively high or low permeability are unsuitable.
16. Appendix G9 is modified to read: Holding/Surge Tank Construction.
17. Appendix G9(a) is modified to read: Plans for holding/surge tanks, if utilized, shall be submitted to the Authority Having Jurisdiction for approval. Such plans shall show all dimensions and such other pertinent data as may be required. A minimum capacity of 50 gallons (189.2 L) is required, when a holding/surge tank is utilized.

18. Appendix G9(b) is modified to read: Holding/surge tanks shall be constructed of solid durable materials, not subject to excessive corrosion or decay, and shall be watertight.
19. Appendix G9(c) is modified to read: Each holding/surge tank shall be vented as required by Chapter 9 of this Code and shall have a locking, gasketed access opening, or approved equivalent, to allow for inspections and cleaning.
20. Appendix G9(d) is modified to read: Each holding/surge tank shall have its rated capacity permanently marked on the unit. In addition, a sign "GRAYWATER IRRIGATION SYSTEM, DANGER - UNSAFE WATER" shall be permanently marked on the holding/surge tank.
21. Appendix G9(e) is modified to read: Each holding/surge tank installed above ground shall have an emergency drain, separate from that connecting the tank with the irrigation/disposal fields, and an overflow drain. The emergency and overflow drains shall have permanent connections to the building drain or building sewer, upstream of the septic tanks, if any. The overflow drain shall not be equipped with a shutoff valve.
22. Appendix G9(f) is modified to read: The overflow and emergency drain pipes shall not be less in size than that of the inlet pipe. The vent size shall be determined based on the total graywater fixture units, as outlined in Table 7-5 of this Code. Unions or equally effective fittings shall be provided for all piping connected to the holding/surge tank.
23. Appendix G9(g) is modified to read: Each holding/surge tank shall be structurally designed to withstand all anticipated earth or other loads. All holding/surge tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (14.4 kPa) when the tank is designed for underground installation.
24. Appendix G9(h) is modified to read: If a holding/surge tank is installed underground, the system must be designed so that the tank overflow will gravity drain to the existing sewer line or septic tank. The tank shall be protected against sewer line backflow by a backwater valve.
25. Appendix G9(i)(1) is modified to read: Steel holding/surge tanks shall be protected from corrosion, both externally and internally, by a coating acceptable to the Authority Having Jurisdiction.

26. Appendix G9(i)(2) is modified to read: Holding/surge tanks constructed of concrete, fiberglass or alternative material may be approved by the Authority Having Jurisdiction.

27. Appendix G10 is modified to read: Graywater piping discharging into the holding/surge tank or having a direct connection to the sanitary drain or sewer piping shall be downstream of an approved waterseal type trap or traps. If no such trap or traps exist, an approved vented running trap shall be installed upstream of the connection to protect the building from any possible waste or sewer gases. All graywater piping shall be marked or shall have a continuous tape marked with the words "DANGER - UNSAFE WATER." All valves, including the 3-way valve, shall be readily accessible and shall be approved by the Authority Having Jurisdiction. A backwater valve, installed pursuant to this Code, shall be provided on all holding/surge tank drain connections to the sanitary drain or sewer piping.

28. Appendix G11(b) is modified to read: Aggregate or clean stone, varying in size from 3/4 inch (19.1 mm) to 2 1/2” (63.5 mm) shall be placed in the trench to the depth and grade required by this section. The perforated section shall be laid on the aggregate in an approved manner. The perforated section shall then be covered with aggregate to the minimum depth required by this section. The aggregate shall then be covered with geotextile or landscape filter fabric materials, or similar porous material to prevent closure of voids with earth backfill. No earth backfill shall be placed over the aggregate cover until after inspection and acceptance.

29. Appendix G11(c) is modified. Refer to Table A.

30. Appendix G12(a) is modified to read: Other collection and distribution systems may be approved by the Authority Having Jurisdiction as allowed by Section 301.0 [Standards and Alternatives] of this Code.

31. Appendix G12(b) is modified to read: Nothing contained in this appendix shall be construed to prevent the Authority Having Jurisdiction from requiring an alternative design if the Authority Having Jurisdiction determines that the first submitted design will not maintain a safe and sanitary condition.

32. Table G-1 is modified. Refer to Table B - Location of Graywater System and Setback Requirements.
33. Table G-2 is modified. Refer to Table C - Effluent Application Loading Rates to Soil for Graywater Systems.
34. Figure G-1 is modified. Refer to Illustration A - Graywater System Tank - Gravity.
35. Figure G-2 is modified. Refer to Illustration B - Graywater System Tank - Pumped.
36. Figure G-3 is modified. Refer to Illustration C - Graywater System Multiple Tank Installation.
37. Figure G-4 is modified. Refer to Illustration D - Graywater System Underground Tank - Pumped.
38. Figure G-5 is modified. Refer to Illustration E - Graywater System Typical Irrigation Zone Layout.

Table A. Irrigation Disposal Fields

Irrigation/disposal fields shall be constructed as follows:

	Minimum	Maximum
Number of perforated drain lines per irrigation zone	1	--
Length of each perforated drain line	--	100’ (30.5 m)
Bottom width of trench	6” (15.2 cm)	24” (61.0 cm)
Spacing of lines, center-to-center	4’ (1/2 m)	--
Depth of earth cover over aggregate	9” (22.9 cm)	
Depth of aggregate cover over the lines	2” (5.1 cm)	--
Depth of aggregate beneath lines	3” (7.6 cm)	--
Grade of perforated lines	Level	3”/100’ (7.6 cm/30.5 m)
Total depth of trench	17” (43.1 cm)	24” (61 cm)

Table B. Location of Graywater System and Setback Requirements

Minimum Horizontal Distance in Clear Required From:	Holding/Surge Tank (feet)(meters)	Irrigation/Disposal Field (feet)(meters)
Building structures (see footnote 1)	5’ (1.5 m) (see footnote 2)	2’ (0.6 m) (see footnote 3)
Property line adjoining private property	5’ (1.5 m)	(see footnote 4)
Water supply wells (see footnote 5)	100’ (30.5 m)	100’ (30.5 m)
Streams, lakes, and reservoirs (see footnote 5)	100’ (30.5 m)	100’ (30.5 m) (see footnote 6)
Domestic water source (see footnote 7)	200’ (61.0 m)	200’ (61.0 m)
Dry wash/drainage easements (see footnote 10)	50’ (15.2 m)	50’ (15.2 m)
Sewage pits	5’ (1.5 m)	5’ (1.5 m)
Disposal field and 100% expansion area	5’ (1.5 m)	4’(see footnote 8)
Septic tank	0’	5’ (1.5 m)
On-site domestic water service line	5’ (1.5 m)	5’ (1.5 m)
Pressurized public water main	10’ (3.0 m)	10’ (3.0 m) (see footnote 9)

Notes: When irrigation/disposal fields are installed in sloping ground, the minimum horizontal distance between any part of the distribution system and the ground surface shall be 15’ (4.6 m).

1 Including porches and steps, whether covered or uncovered, breezeways, roofed patios, carports, covered walks, covered driveways and similar structures or appurtenances.

2 The distance may be reduced to 0’ for above-ground tanks when first approved by the Authority Having Jurisdiction.

3 Assumes a 45° angle from foundation.

4 The setback requirement is 5’ (1.5 m) unless the property is not served by a central system for the distribution of water and: There is no existing or proposed individual well on adjoining private property, in which case the setback is 50’ (15.2m); or

a. A 100’ (30.5m) separation distance cannot be maintained from an existing or proposed individual well, in which case the setback is the distance necessary to maintain the 100’ (30.5m) separation; or

b. The applicable setback requirement in (a) or (b) may be reduced to a minimum of 5’ (1.5m) with a variance from the Authority Having Jurisdiction.

5 Where special hazards are involved, the distance required shall be increased as may be directed by the Authority Having Jurisdiction.

6 These minimum clear horizontal distances shall also apply between the irrigation/disposal field and the maximum lake or reservoir level.

7 A point of water intake or suction pipeline from any stream, lake, or reservoir that is used for the purpose of providing water for human consumption.

8 Plus 2’ (0.6 m) for each additional foot (meter) of depth in excess of 1’ (0.3 m) below the bottom of the drain line.

9 For parallel construction/for crossings, approval by the Authority Having Jurisdiction shall be required.

10 Fifty foot (15.2 m) setback is measured from the edge of the defined natural channel bank for a drainage area of at least five acres (2 hectare) or a drainage easement, whichever is less. Setback may be reduced to 25’ (7.6 m) up gradient from the system, if channel erosion protection is provided (naturally or man-made) and approved by the Authority Having Jurisdiction.

Table C. Effluent Application Loading Rates to Soil for Graywater Systems

Instructions: Read questions in sequence beginning with A. The maximum soil loading rate in gallons per day per square foot (gpd/sq. ft.) (Lpd/sq. m.) corresponds to the first "yes" response to the questions.

	Soil Application Rates gpd/sq. ft. (Lpd/sq. m.)	Percolation Rate Range minutes/inch (min./cm.)
A. Is the horizon gravelly coarse sand or coarser?	0 (0) (see footnote)	--
B. Is the structure of the horizon moderate or strongly platy?	0 (0) (see footnote)	--
C. Is the texture of the horizon sandy clay loam, clay loam, silty clay loam, or finer and structure weak and	0 (0) (see footnote)	--
D. Is the moist consistence stronger than firm or any cemented class?	0 (0) (see footnote)	--
E. Is texture sandy clay, clay, or silty clay of high clay content and structure massive or weak?	0 (0) (see footnote)	--
F. Is texture sandy clay loam, clay loam, silty clay loam, or silty loam and structure massive?	0 (0) (see footnote)	--
G. Is the texture of the horizon loam or sandy loam and the soil structure massive?	.20 (8.15)	16-45 (6.3-17.7)
H. Is texture sandy clay, clay or silty clay of low clay content and the structure moderate or strong?	.20 (8.15)	45-60 (17.7-23.6)
I. Is texture sandy clay loam, clay loam, or silty loam and structure weak?	.20 (8.15)	45-60 (17.7-23.6)
J. Is texture sandy clay loam, clay loam, or silty clay loam and structure moderate or strong?	.40 (16.30)	45-60 (17.7-23.6)
K. Is texture sandy loam, loam, silty loam and structure weak?	.40 (16.30)	16-45 (6.3-17.7)
L. Is texture sandy loam, loam, silty loam and structure moderate or strong?	.60 (24.45)	16-45 (6.3-17.7)
M. Is texture fine sand, very fine sand, loamy fine sand, or loamy very fine sand?	.40 (16.30)	10-30 (3.9-11.8)
N. Is texture loamy sand or sand?	.80 (32.59)	10-20 (3.9-7.9)

O. Is texture coarse sand?	1.20 (48.89)	2-10 (0.8-3.9)

Note:

Graywater systems for these soil types shall comply with paragraph G12(a) and G12(b) of this appendix.

Illustration A. Graywater System Tank - Gravity

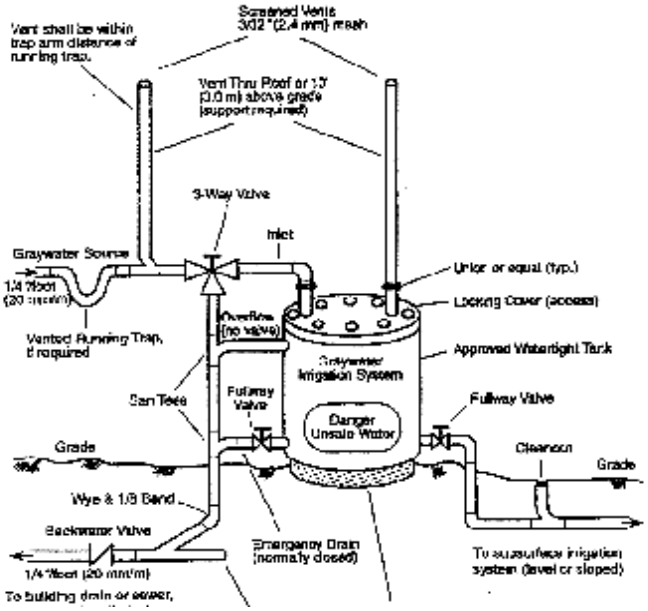


Illustration B. Graywater System Tank - Pumped

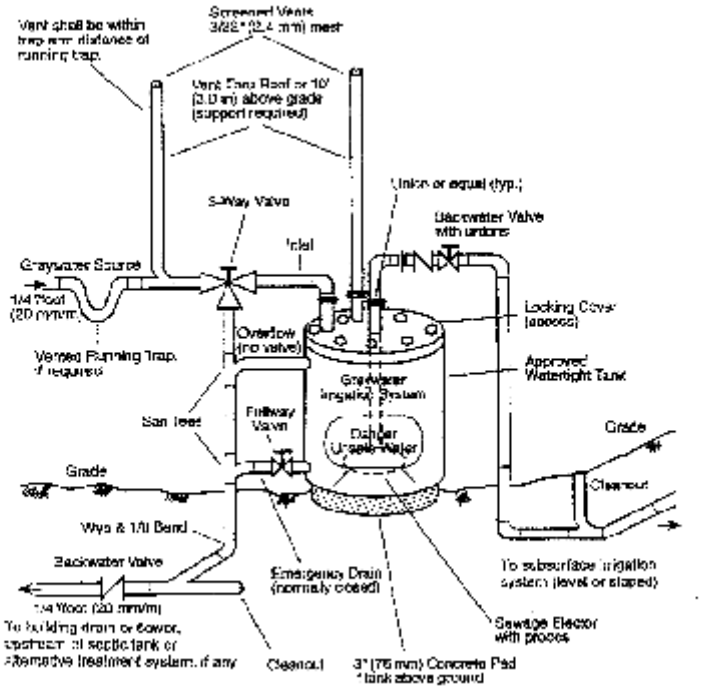


Illustration C. Graywater System Multiple Tank Installation

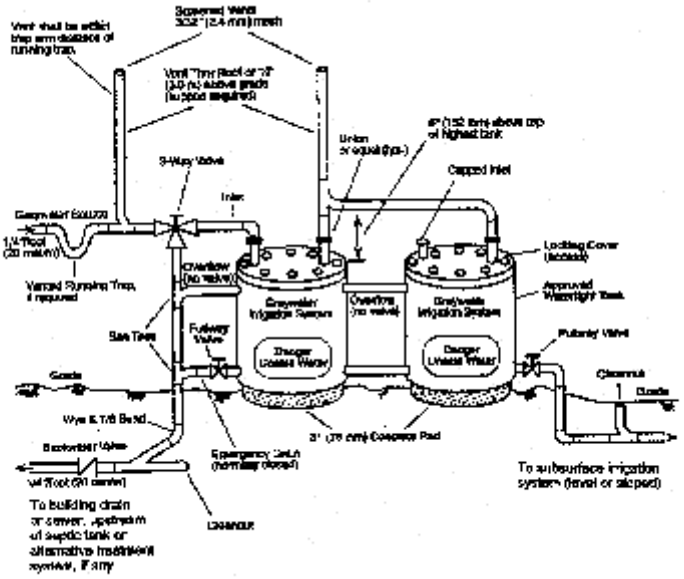


Illustration D. Graywater System Underground Tank - Pumped

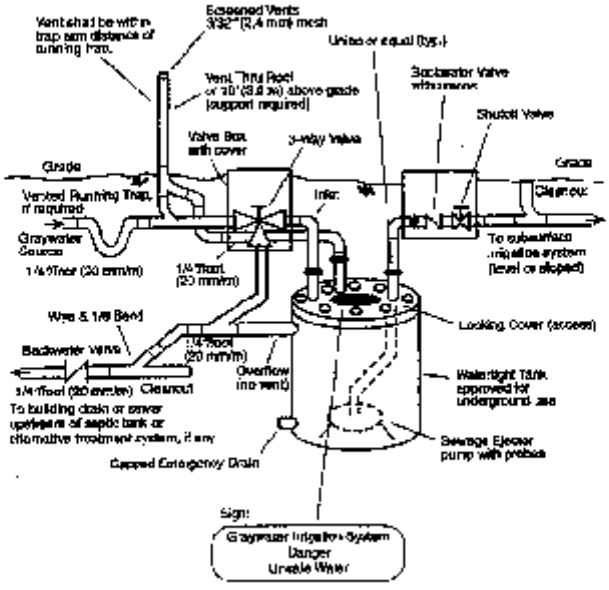
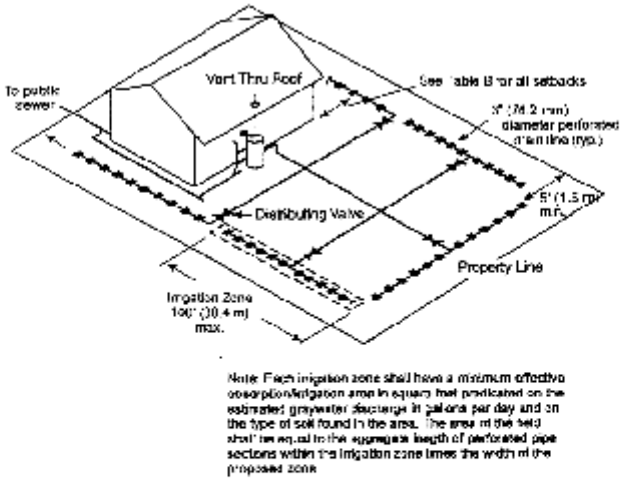
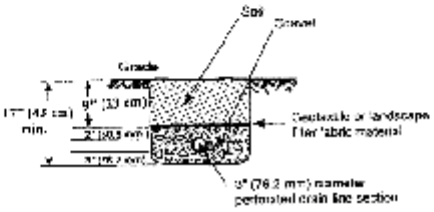


Illustration E. Graywater System Typical Irrigation Zone Layout



Note: Each irrigation zone shall have a minimum effective absorption/irrigation area in square feet predicated on the estimated graywater discharge in gallons per day and on the type of soil found in the area. The area of the field shall be equal to the aggregate length of perforated pipe sections within the irrigation zone times the width of the proposed zone.



R4-48-208. Appendix H, Recommended Procedures for Design, Construction, and Installation of Commercial Kitchen Grease Interceptors

The Uniform Plumbing Code incorporated in R4-48-102(A) is modified as follows:

Appendix H 103.1 is modified to read: Interceptors shall be constructed in accordance with the design approved by the Authority Having Jurisdiction and shall have a minimum of two compartments with fittings designed for grease retention. Grease interceptors shall be constructed of solid durable materials, not subject to excessive corrosion or decay, and shall be watertight.

R4-48-209. Reserved

R4-48-210. Appendix J, Reclaimed Water Systems for Non-residential Buildings

A. Appendix J of the International Association of Plumbing and Mechanical Officials' (I.A.P.M.O.) Uniform Plumbing Code (2003 Edition) is incorporated by reference. This incorporation by reference does not include any later amendments or editions. Copies of the incorporated material are available from I.A.P.M.O. at 5001 E. Philadelphia Street, Ontario, CA 91761-2816 and are on file with the Arizona Uniform Plumbing Code Commission.

B. Appendix J, incorporated by subsection (A) is modified as follows:

1. Appendix J2, paragraph 1, is modified to read: Reclaimed water is water approved for specific uses after the water has been treated or processed by a wastewater treatment plant operated pursuant to statutes and rules of the Arizona Department of Environmental Quality. The level of treatment and quality of the reclaimed water for the uses specified in this appendix are established by the Arizona Department of Environmental Quality pursuant to Arizona Administrative Code R18-9-703.
2. Appendix J2, paragraph 2, is deleted.

R4-48-211. Appendix K, Private Sewage Disposal Systems

In accordance with A.R.S. § 41-619(B)(4), the Arizona Uniform Plumbing Code Commission adopts Appendix K of the International Association of Plumbing and Mechanical Officials' (I.A.P.M.O.) Uniform Plumbing Code (2003 Edition). Notwithstanding any other provision of R4-48-127, the provisions of R4-48-127 do not require an Authority Having Jurisdiction to act in a manner that conflicts with other provisions of state law or duplicates any act required by other provisions of state law.

K 1 Private Sewage Disposal - General

(a) Where permitted by Section 713.0, the building sewer may be connected to a private sewage disposal system complying with the provisions of this appendix. The type of system shall be determined on the basis of location, soil absorption rate, soil classification, and depth to the ground water below the land surface and shall be designed to receive all sewage from the property. The system, except as

otherwise approved, shall consist of a septic tank with effluent discharging into a subsurface disposal field, into one or more seepage pits, or into a combination of subsurface disposal field and seepage pits. The Authority Having Jurisdiction may grant exceptions to the provisions of this appendix for permitted structures which have been destroyed due to fire or natural disaster, and which cannot be reconstructed in compliance with these provisions.

(b) Where the quantity or quality of the sewage is such that the above system cannot be expected to function satisfactorily; for commercial, agricultural, and industrial plumbing systems; for installations where appreciable amounts of industrial or indigestible wastes are produced; for occupancies producing abnormal quantities of sewage or liquid waste; or when grease interceptors are required by other parts of this Code, the method of sewage treatment and disposal shall be first approved by the Authority Having Jurisdiction. Special sewage disposal systems for minor, limited, or temporary uses shall be first approved by the Authority Having Jurisdiction. This appendix applies only to systems with an inflow of 3000 gallons (11,355 liters) per day or less.

(c) Disposal systems shall be designed to utilize the most porous or absorptive portions of the soil formation. Where the depth to the ground water extends to within the specified minimum vertical separation for the proposed system, a private sewage disposal system shall not be installed.

(d) The minimum vertical separation from the bottom of the disposal field or seepage pit shall be as specified in Tables K-4 (A), K-4 (B), K-5 or K-7.

(e) When making a site investigation and determining the soil characterization and soil absorption rates for private sewage disposal systems and alternative private sewage treatment and disposal systems, an investigator shall use one or more of the following standards, including (1) through (7), incorporated by reference, or methods or equivalent standards approved by the Authority Having Jurisdiction. The incorporated standards do not include later amendments or editions and are available from the Registrar of Contractors and the Office of the Secretary of State:

(1) ASTM D 5879-95, Standard Practice for Surface Site Characterization for On-Site Septic Systems;

(2) ASTM D 5921-96, Standard Practice for Subsurface Site Characterization of Test Pits for On-Site Septic Systems;

(3) ASTM D 1452-80 (Reapproved 1995), Standard Practice for Soil Investigation and Sampling by Auger Borings. This method shall be used in areas if the depth to groundwater may be within the required minimum vertical separation from the bottom of the subsurface disposal field for the private sewage disposal system;

(4) ASTM C1227-00, Standard Specification for Precast Concrete Septic Tanks;

(5) IAPMO PS1-93, Material and Property standard for Prefabricated Septic Tanks;

(6) ACI 318-99, Building Code Requirements for Structural Concrete and ACI 318R-99, Commentary;

(7) ACI 350R-89, Environmental Engineering Concrete Structures, or

(8) Percolation testing as specified in Section K 15.

(f) A site investigation shall include a log of soil formations, percentage of rock, texture, structure, consistence, and mottles as provided in ASTM D-5921-96, depth to ground water below the land surface as determined by test holes dug in close proximity to any proposed disposal field or seepage pit (for example, published groundwater data, subdivision reports, or relevant well data), soil classification, or percolation test results. Other information acceptable to the Authority Having Jurisdiction may be utilized to determine soil performance equivalent to that achieved by the standards or methods specified in Section K 1 (e).

(g) All private sewage disposal systems shall be so designed that additional seepage pits or subsurface drain fields, equivalent to at least 100% of the required original system, may be installed if the original system cannot absorb all the sewage. No division of the lot or erection of structures on the lot shall be made if such division or structure impairs the usefulness of the 100% expansion area.

(h) No property shall be improved in excess of its capacity to treat and dispose of sewage effluent by the means provided in this Code.

(i) No private sewage disposal system, or part thereof, shall be located in any lot other than the lot which is the site of the building or structure served by such system; nor shall any private sewage disposal system or part thereof, be located at any point having less than the minimum distances indicated in Table K-1. Nothing in this Code shall be construed to prohibit the use of all or part of an abutting lot to provide additional space for a private sewage disposal system or part thereof, when proper cause, transfer of ownership, or change of boundary not in violation of other requirements has been first established to the satisfaction of the Authority Having Jurisdiction. The instrument recording such action shall constitute an agreement with the Authority Having Jurisdiction which shall clearly state and show that the areas so joined or used shall be maintained as a unit during the time they are so used. Such agreement shall be recorded in the office of the County Recorder as part of the conditions of ownership of said properties, and shall be binding on all heirs, successors, and assigns to such properties. A copy of the instrument recording such proceedings shall be filled with the Authority Having Jurisdiction.

(j) No building permit shall be issued until the Authority Having Jurisdiction has approved the site for a private sewage disposal system.

(k) Nothing contained in this appendix shall be construed to prevent the Authority Having Jurisdiction from requiring compliance with statutes, ordinances, or rules having higher requirements than those contained herein, where such statutes, ordinances, or rules are essential to maintain a safe and sanitary condition.

(1) Exception: The Authority Having Jurisdiction may, at its discretion, approve an alternative private sewage treatment and disposal system.

K 2 Definitions

(a) Authority Having Jurisdiction - A municipality or county that enforces the state plumbing code. The director of the Arizona Department of Environmental Quality may delegate functions, powers, or duties to a municipality or county under A.R.S. § 49-107.

(b) Aggregate - Clean graded hard rock or gravel. Aggregate shall have not more than 2% fines by weight. Aggregate shall be of uniform size, 3/4” (19.1 mm) to 2 1/2” (63.5 mm) in diameter, and shall offer 30% or more void space. The aggregate shall have a hardness value of three or greater on the Moh's Scale of Hardness (aggregate that can scratch a copper penny without leaving any residual rock material on the coin would be a hardness of three or more on the Moh's Scale of Hardness). Volcanic rock that meets the above criteria may be substituted for hard rock or gravel.

(c) Bedroom - A habitable room providing privacy and used for sleeping purposes. For the purposes of this Code, a loft or a basement shall be considered a bedroom.

(d) Disposal Area - Area within the horizontal plane that is delineated by a simple figure that encompasses the soil absorption components of a wastewater system.

(e) Disposal Bed - A type of bottom area absorption system that uses an underground area up to 12’ (3.7 m) wide, partially filled with aggregate. Piping distributes the effluent evenly throughout the entire bed.

(f) Disposal Field (Drainfield) - An aggregate-filled bed or trench into which effluent is discharged for final treatment and disposal. A soil absorption system is constructed to permit the discharge of treated sewage effluent into native soil. Construction is performed following site-specific specifications including soil excavation and the installation of disposal piping, aggregate, and other specified components and materials. The plan view of a drainfield shows the disposal area. The soil absorption area of a drainfield is the total surface within a drainfield that is approved by the Authority Having Jurisdiction for the discharge of treated sewage effluent into the native soil.

(g) Disposal Pipe - Pipe that is placed in disposal trenches, beds, or a seepage pit to disperse effluent to the soil absorption surfaces.

(h) Disposal Pit (Seepage Pit) - A type of sidewall absorption system that uses a vertical, cylindrical underground excavation constructed to permit disposal of effluent by soil absorption through the pit's walls.

(i) Disposal Trench - A type of absorption trench that uses an area, excavated 1’ (.3 m) to 3’ (.9 m) wide, which contains aggregate and a single effluent disposal pipe.

(j) Distribution Box - A watertight structure that receives and distributes effluent in equal portions to two or more pipes that convey effluent to disposal pipes.

(k) Domestic Water Source Intake - A point of water intake or a suction pipeline located in any stream, lake, or reservoir that is used for the purpose of providing water for human consumption.

(l) Dosing Tank - A watertight receptacle located between the treatment unit and the drainfield, equipped with a pump or siphon, that stores and delivers doses of treated sewage effluent to the drainfield.

(m) Dry Wash - A watercourse that only flows in direct response to precipitation and whose channel at all times is above the water table.

(n) Effective Absorption Area - Area of native soil that is approved by the Authority Having Jurisdiction for the absorption of treated sewage effluent in a disposal trench, pit, or other approved drainfield.

(o) Failure - The inability of any disposal system component to function as designed.

(p) Five-Day Biochemical Oxygen Demand (BOD) - The quantity of oxygen used in the biochemical oxidation of organic matter in five days at 20° Centigrade under specific conditions and reported as milligrams per liter (mg/l).

(q) Groundwater - Water that is in the zone of saturation and under pressure equal to or greater than atmospheric pressure.

(r) Impermeable layer - A soil zone with a percolation rate numerically greater than 120 minutes per inch or soils classified as impermeable (for example: clay or rock).

(s) Live stream - A watercourse with perennial flow or where surface water is present at least 10% of the time during a calendar year, based upon historic flow or weather records.

(t) Mottles - Soil color patterns caused by alternating saturated (anaerobic) and unsaturated (aerobic) soil conditions.

(u) Percolation Test - An empirical test used to estimate the rate at which effluent is absorbed by the soil.

(v) Repair - The extension, alteration, replacement, or relocation of existing components of a private sewage disposal system.

(w) Rock - A body of consolidated or partially consolidated material, composed of minerals and located at or below the land surface. Rock includes bedrock (fractured or unfractured) and partially-weathered rock that is relatively hard and cannot be dug with a hand shovel.

(x) Septage - All sludge, scum, liquid, or other material treated using a private sewage disposal system.

(y) Site - The location of an existing or proposed private sewage disposal system.

(z) Site Investigation - The practice of investigating, evaluating, and reporting on soil, topographic, and location conditions that affect the design and function of a private sewage disposal system.

(aa) Soil Evaluation - The practice of investigating, characterizing, and reporting the properties of soil used to absorb treated sewage effluent in a zone of unsaturated flow.

(ab) Soils - The naturally occurring, unconsolidated mineral and organic material on the land surface, developed from rock and other parent material that consists of sand, silt, and clay-sized particles and variable amounts of organic matter. In a zone of transition between two types of soil, the soil will be classified according to those soil characteristics that represent 51% or more of the total zone.

(ac) Soil Profile - A vertical cross-section of the undisturbed soil showing the characteristic soil horizontal layers or soil horizons that have formed as a result of the combined effects of parent material, topography, climate, biological activity, and time.

(ad) Total Suspended Solids (TSS) - Solids in wastewater that can readily be removed by standard filtering procedures in a laboratory and reported in milligrams per liter (mg/l).

K 3 Capacity of Septic Tanks

The design liquid capacity of all septic tanks shall conform to Table K-2 and K-3.

K 4 Area of Disposal Fields

The minimum effective absorption area in disposal fields and estimated waste/sewage flow rate shall conform to Tables K-3, K-4 (A), K-4 (B) and K-7 and shall be as follows:

(1) When disposal fields are installed, a minimum of 150 square feet (13.9 sq. m) of trench bottom shall be provided for each system exclusive of any hard pan, rock, clay, or other impervious formations. Sidewall area in excess of the required 12” (30.5 cm) and not to exceed 36” (91.4 cm) below the disposal pipe may be added to the trench bottom area when computing absorption areas.

(2) When leaching beds are installed in lieu of trenches, the area of each such bed shall be at least 50% greater than the tabular requirements for trenches. Perimeter sidewall area in excess of the required 12” (30.5 cm) and not to exceed 36” (91.4 cm) below the disposal pipe may be added to the trench bottom area when computing absorption areas.

(3) No excavation for a disposal pipe or disposal bed shall extend within the system's specified minimum vertical separation in order to ensure the system does not contaminate the underlying groundwater in excess of Arizona Aquifer Water Quality standards.

(4) When leaching chambers are installed in lieu of pipe and aggregate, an equivalent absorption area shall be provided based on the calculated effective chamber absorption area. The calculated effective chamber absorption area is the nominal open-bottom absorption area (length times width) times 1.43, plus the product of two times the vertical height of the sidewalls times the chamber length. The sidewall chamber shall provide a minimum of 35% open area for side wall credit to be allowed, and shall be constructed to minimize the movement of fines into the chamber area. The use of filter fabric or geotextile against sidewall openings is prohibited. The required minimum absorption area shall be calculated using table K-4 (A), K-4 (B) or K-7.

Example:

The chamber to be used has an open bottom 3’ wide, 6’ long, and has 1 vertical foot (0.9 m, 1.8 m, and 0.3 m deep) of sidewall. The disposal system is for a 3-bedroom dwelling. The soil is loamy sand (N). Depth of chamber bottom is to be less than 5’ (1.5 m) below the finished grade (the installation is considered a shallow system).

The calculated effective chamber absorption area per chamber is:

Chamber bottom area = 3’ x 6 square feet (0.9 x 1.8 sq. m.) of open bottom area x 1.43 = 25.74 square feet (2.39 sq. m.), plus

Chamber sidewall = two sidewalls x 1’ high x 6’ long = 12 square feet (2 x 0.30 m. x 1.83 m. = 1.11 sq. m.).

The effective chamber absorption area = the chamber bottom plus sidewalls

Chamber sidewall = 25.74 square feet (2.39 sq. m.) + 12 square feet (1.11 sq. m.) = 37.74 square feet (3.5 sq. m.) per chamber.

The number of chambers needed is calculated as follows:

Wastewater flow rate is three bedrooms x 150 gallons per day (568 lpd), or 450 gallons per day (1703 lpd). The soil application rate for loamy sand [Table K-4 (A), Question N, Column A] is listed as 0.80 gallons per day per square foot (32.6. lpd/sq. m.) Dividing the flow rate, 450 gallons per day (1703 lpd), by the soil application rate, 0.80 gpd/sq. ft. (32.6 lpd/sq. m.) yields a total absorption area of 562.5 square feet (52.3 sq. m.). Since the effective chamber absorption area of each chamber is 37.74 square feet (3.5 sq. m.), a total of 14.9 chambers are needed.

Required area = 562.5 square feet (52.3 sq. m.) divided by 37.74 square feet (3.5 sq. m.).

Round up to a total chamber requirement of 15 chambers.

K 5 Area of Seepage Pits

The minimum effective absorption area in any seepage pit shall be predicated on estimated waste/sewage flow rates in Table K-3 and shall conform to Tables K-5 and K-6 as follows:

(1) The minimum effective absorption area in any seepage pit shall be calculated as the excavated sidewall area below the inlet exclusive of any hardpan, rock, clay, or other impervious formations.

(2) Seepage pit sizes may be computed from Table K-5 or using percolation tests prescribed in K 15.

(3) The minimum required area of porous formation shall be provided in one or more seepage pits. No seepage pit excavation shall extend into the system's specified minimum vertical separation from the

water table nor to a depth where sewage may contaminate the underlying groundwater that is protected by state law for domestic or drinking water purposes.

(4) The applicant shall supply acceptable evidence of depth to groundwater to the Authority Having Jurisdiction.

(5) A boring log that describes soil from the seepage pit shall be submitted to the Authority Having Jurisdiction.

K 6 Soil Testing

Seepage pit and disposal field sizes shall be computed from Tables K-4 (A), K-4 (B), K-5, K-6, and K-7.

K 7 Septic Tank Design and Construction

(a) All septic tanks shall meet the specifications set forth in K 7, (b) through (q).

(b) Septic tank designs shall produce a clarified effluent and shall provide adequate space for sludge and scum accumulations.

(c) Septic tanks shall be constructed of solid durable materials, not subject to excessive corrosion or decay and shall be watertight.

(d) Septic tanks shall have a minimum of two compartments except when placed in series. The inlet compartment of any septic tank not placed in series shall be nominally 67 to 75% of the total required capacity of the tank. Septic tanks placed in series shall be considered as a unit and shall meet the same criteria as a single tank. The liquid depth of the septic tank shall not be less than 42” (1.07m). A septic tank of 1000 gallon capacity shall have a length of at least 8’ (2.44m). For septic tanks of greater capacity, the tank length shall be at least two times but not more than three times the width.

(e) Access to each septic tank interior shall be provided by at least two access openings 20” (50.8 cm) in minimum dimension. One access opening shall be located over the inlet and one access opening shall be located over the outlet. Whenever a first compartment exceeds 12’ (3.7 m) in length, an additional access opening shall be provided over the baffle wall. Access openings and risers, if needed, shall be constructed to ensure accessibility within 6” (0.15 m) below grade. A permanent surface marker appropriate to the site shall be provided for locating the septic tank access openings for maintenance.

(f) The inlet and outlet pipe openings shall be not less in size than the connecting sewer pipe. The vertical leg of a round inlet and outlet fittings shall not be less in size than the connecting sewer pipe nor less than 4” (10.1 cm). A baffle-type fitting shall have the equivalent cross-sectional area of the connecting sewer pipe and not less than a 4” (10.2 cm) horizontal dimension when measured at the inlet and outlet pipe inverts.

(g) The inlet and outlet pipe or baffle shall extend 4” (10.2 cm) above and at least 12” (30.5 cm) below the water surface. The invert of the inlet pipe shall be at a level not less than 2” (5.1cm) above the invert of the outlet pipe.

(h) Inlet and outlet pipe fittings or baffles, and compartment partitions shall have a free vent area equal to the required cross-sectional area of the house sewer or private sewer discharging therein to provide free ventilation above the water surface from the disposal field or seepage pit through the septic tank, house sewer, and stack to the outer air.

(i) The sidewalls shall extend at least 12” (30.5 cm) above the liquid depth. The cover of the septic tank shall be at least 2” (5.1 cm) above the top of the inlet fitting vent opening.

(j) Partitions or baffles between compartments shall be of solid, durable material and shall extend at least 4” (10.1 cm) above the liquid level. The open area of the baffle shall be between one and two times the open area of the inlet pipe or for a horizontal slot, shall be no more than 6” in height, and shall be located at the midpoint of the liquid level of the baffle. Wooden baffles are prohibited.

(k) Each tank shall be structurally designed to withstand all anticipated earth or other loads. All septic tank covers shall be capable of supporting an earth load of 300 pounds per square foot (14.4 kPa) for a minimum soil cover of 2’ (0.61 m). When the top of the tank is greater than 2’ (0.61 m) below finished grade, the septic tank and cover shall be capable of supporting an additional load of 150 pounds per square foot (7.2 kPa) for each additional foot of cover.

(l) Septic tanks installed under concrete or black top paving shall have the required access openings extended to grade in a manner acceptable to the Authority Having Jurisdiction.

(m) The inlet and outlet ends of the tank shall be clearly and permanently marked on the outside of the tank with the terms "INLET" or "IN," and, "OUTLET" or "OUT," above, or to the right or left of the corresponding inlet and outlet openings.

(n) It is permissible to have septic tanks placed in series to meet the minimum septic tank capacity requirements.

(o) Materials

(1) Cast in Place Concrete Septic Tanks

All concrete septic tanks shall be protected from corrosion by coating with an approved bituminous coating by construction with a concrete mix incorporating 15% to 18% fly ash, or by other acceptable means. The coating shall extend to at least 4” (101.6 mm) below the water line, and shall cover all of the internal area above that point. Septic tanks constructed in place shall comply with the American Concrete Institute (ACI) standards 318-99, 318R-99, and 350R-89.

(2) Steel Septic Tanks

The minimum wall thickness of any steel septic tank shall be No. 12 U.S. gauge (0.109 cm) and each tank shall be protected from corrosion, both externally and internally, by an approved bituminous coating or by other acceptable means.

(3) Prefabricated septic tanks

Materials for precast concrete septic tanks shall comply with ASTM C1227-00. Materials for fiberglass or polyethylene septic tanks shall comply with IAPMO PS1-93. If any conflict exists between this appendix and ASTM C1227-00 or IAPMO PS1-93, the requirements of this appendix shall apply.

(4) Alternative materials

Septic tanks constructed of alternative materials may be approved by the Authority Having Jurisdiction if they comply with approved, applicable standards in this Code.

(5) Prohibited Materials

Wooden, block, and bare steel septic tanks are prohibited.

(p) All tanks shall be clearly and permanently marked with the manufacturer's name and registered trademark, the month and year of manufacture, the maximum recommended depth of earth cover in feet or meters and the design liquid capacity of the tank. The markings shall be adequately protected from corrosion so as to remain permanent and readable over the life of the tank.

(q) A septic tank effluent filter approved by the Authority Having Jurisdiction shall be installed on all new private sewage disposal systems. The filter shall prevent the passage of solids larger than 1/8" (3.2 mm) in diameter while under 2' (0.61 m) of hydrostatic head. The filter shall be constructed of materials that are resistant to corrosion and erosion and be of adequate size for the anticipated hydraulic and organic loading.

K 8 Disposal Fields

(a) Distribution lines shall be constructed of clay tile laid with open joints, perforated clay pipe, perforated high density polyethylene pipe, perforated ABS pipe, perforated PVC pipe, or other approved materials, provided that sufficient openings are available for distribution of the effluent into the trench area.

(b) Before placing aggregate or drain lines in a prepared excavation, all smeared or compacted surfaces shall be removed from trenches by raking to a depth of 1" (2.5 cm) and the loose material removed. Aggregate shall be placed in the trench to the depth and grade required by this section. Drainpipe shall be placed on aggregate in an approved manner. The drain lines shall than be covered with aggregate to the minimum depth required by this section and this covered with landscape filter fabric, geotextile, or similar porous material to prevent closure of voids with earth backfill. No earth backfill shall be placed over the aggregate cover until after inspection and acceptance.

Exception:

Listed or approved leaching chambers may be used in lieu of pipe and aggregate. Chamber installations shall follow this appendix for disposal fields, where applicable, and shall conform to manufacturer's installation instructions.

(c) A grade board staked in the trench to the depth of aggregate shall be utilized when distribution line is constructed with drain tile or a flexible pipe material which will not maintain alignment without continuous support.

(d) Where two or more drain lines are installed, an approved distribution box of sufficient size to receive all lateral lines and flows shall be installed at the head of each disposal field. The inverts of all outlets shall be level and the invert of the inlet shall be at least 1” (2.5 cm) above the outlets. Distribution boxes shall be designed to ensure equal flow and shall be installed on a stable level surface such as a concrete slab or natural or compacted soil. Concrete distribution boxes shall be protected from corrosion by coating with an appropriate bituminous coating, or constructed of concrete with a 15% to 18% fly ash content, or by other approved methods acceptable to the Authority Having Jurisdiction.

(e) All laterals from a distribution box to the disposal field shall be approved pipe with watertight joints. Multiple disposal field laterals, wherever practicable, shall be of uniform length.

(f) Connections between a septic tank and a distribution box shall be laid with approved pipe with watertight joints on natural ground or compacted fill.

(g) Disposal fields and beds shall be constructed as specified in Tables K-4 (A) and K-4 (B) and the following criteria:

Gravity Trenches	Minimum	Maximum
Number of trenches (see footnote 1)	1	-
Length of trench	-	100’ (30.5 m)
Bottom width of trench	12” (30.5 cm)	3” (91.4 cm)
Depth of cover over disposal pipe	9” (22.9 cm)	24” (61.0 cm) (see footnote 2)
Aggregate material under disposal pipe	12” (30.5 cm)	-
Aggregate material over disposal pipe	2”(5.1 cm)	2” (5.1 cm)
Slope of disposal pipe	Level	Level
Disposal pipe diameter	3” (7.6 cm)	4” (10.1 cm)
Spacing of disposal pipe, or leaching	Two x effective depth (see footnote 3) or 5’ (1.5 m) whichever is greater	

Footnotes:

1 Two trenches are recommended.

2 For more than 24” (61.0 cm), SDR 35 or equivalent strength pipe is required.

3 The distance between the bottom of the disposal pipe and the bottom of the trench bed.

Gravity Beds	Minimum	Maximum
Number of disposal pipes	2	-
Length of bed	-	100’ (30.5 m)
Distance between disposal pipes	4’ (1.2 m)	6’ (1.8 m)
Width of bed	10’ (3.0 m)	12’ (3.66 m)
Distance from pipe to sidewall	3’ (0.91 m)	3’ (0.91 m)
Depth of cover over disposal pipe	9” (22.9 cm)	14” (35.6 cm)
Aggregate material under disposal pipe	12” (30.5 cm)	-
Aggregate material over disposal pipe	2” (5.1 cm)	2” (5.1 cm)
Slope of disposal pipe	Level	Level

Disposal pipe diameter	3” (7.6 cm)	4” (10.1 cm)

Disposal fields, trenches and leaching beds shall not be paved over or covered by concrete or any material that can reduce or inhibit any possible evaporation of sewer effluent.

(h) When necessary on sloping ground to maintain a level disposal pipe, leach trenches or disposal beds shall be stepped. The lines between each horizontal leaching section shall be made with approved watertight joints and installed on natural or unfilled ground.

K 9 Seepage Pits

(a) Seepage pits constructed in accordance with this appendix are considered a method of disposing of septic tank effluent. Criteria used for determining the suitability of a seepage pit are contained in table K 5. The capacity of seepage pits shall be based on the quantity of liquid waste discharging there into, and on the character and porosity of the surrounding soil and shall conform to Section K 5 of this appendix.

(b) Multiple seepage pit installations shall be served through an approved distribution box or be connected in series by means of a watertight connection laid on undisturbed or compacted soil. The outlet from the pit shall have an approved sanitary tee with the vertical leg extending at least 12” (30.5 cm) below the inlet fitting.

(c) Each seepage pit shall be circular in shape and shall have an excavated diameter of not less than 4’ (1.2 m). Approval shall be obtained prior to construction for any pit having an excavated diameter greater than 6’ (1.8 m).

(d) For gravel filled seepage pits, the entire pit shall be backfilled with aggregate which shall be clean and of uniform gradation, 3/4” (1.9 cm) to 2 1/2” (6.4 cm) in diameter. Material used for backfill shall offer a minimum of 30% void space. Each pit shall have a breather/effluent conductor pipe, which shall consist of a perforated pipe at least 4” (10.2 cm), in diameter, placed vertically within the backfill of the pit. The pipe shall extend from the bottom of the pit to 12” below ground level.

(e) Lined, hollow pits shall be lined with concrete liner, or other approved materials and shall be laid on a firm foundation. Excavation voids behind the liner shall have a minimum of 9” (22.9 cm) of aggregate which shall be clean and of uniform gradation, 3/4” (1.9 cm) to 2 1/2” (6.4 cm) in diameter.

(f) The cover of a lined seepage pit shall be constructed of an approved one- or two-piece reinforced concrete slab of 2500 pounds per square inch (17,238 kPa) minimum compressive strength, not less than 5” (127 mm) thick and designed to support an earth load of not less than 400 pounds per square foot (19.2 kPa). Each cover shall be provided with a 12” (30.5 cm) minimum access hole with plug or cover and shall be coated on the underside with an approved bituminous seal or constructed of concrete with 15% to 18% fly ash content or other nonpermeable protective material. Each cover shall have at least a 4” (10.2 cm) inspection pipe placed vertically not more than 6” below ground level.

(g) The top of the seepage pit cover must be at least 18” (45.7 cm) but not more than 4’ (1.2 m) below the surface of the ground.

(h) An approved vented inlet fitting shall be provided in every seepage pit to prevent the inflow from damaging the sidewall.

Exception:

When using a one- or two-piece concrete slab cover inlet, the fitting may be a 1/4 bend fitting discharging through an opening in the top of the slab cover. For multiple seepage pit installations, the outlet fittings shall be per Section K 9 (b) of this appendix.

(i) Seepage pit design details are shown in Figure K-1 and K-2.

K 10 Cesspools

The use of cesspools for waste disposal is prohibited.

K 11 Interceptor Design Criteria for Private Sewage Disposal Systems

(a) When liquid wastes containing excessive amounts of grease, garbage, flammable wastes, sand, or other ingredients which may affect the operation of a private sewage disposal system, an interceptor for such wastes shall be installed.

(b) Installation of such interceptors shall comply with Section 1008.0 of the Uniform Plumbing Code and their location shall be in accordance with Table K-1 of this appendix.

(c) Sampling box shall be installed when required by the Authority Having Jurisdiction.

(d) Interceptors shall be of approved design and be of not less than two compartments. Structural requirements shall be in compliance with the applicable subparts of Section K 7 of this appendix.

(e) Interceptors shall be located as close to the source as possible and be accessible for servicing. All necessary manholes for servicing shall be at grade level and be gas-tight.

(f) Waste discharge from interceptors may be connected to a septic tank or other primary system or be disposed into a separate disposal system.

(g) Recommended Design Criteria. Minimum design criteria for grease and garbage, commercial kitchens; sand-silt oil, auto washers; and silt-lint grease, laundries, and laundromats. (Formulae may be adapted to other types of occupancies with similar wastes or as determined by the Authority Having Jurisdiction rules.)

Grease and Garbage, Commercial Kitchens								
Number of Meals per peak hour	x	Waste Flow Rate	x	Retention Time	x	Storage Factor	=	Interceptor Size (liquid capacity)

Sand-Silt Oil, Auto Washers								
Number of Vehicles per peak hour	x	Waste Flow Rate	x	Retention Time	x	Storage Factor	=	Interceptor Size (liquid capacity)

Silt-Lint Grease, Laundries, Laundromats										
Number of Machines	x	2 cycles per hour	x	Waste Flow Rate	x	Retention Time	x	Storage Factor	=	Interceptor Size (liquid capacity)

Waste Flow Rate

See Table K-3 of this appendix for estimated flow rates.

Estimated Retention Times	
Commercial kitchen waste: Dishwasher and/or disposal	2.5 hours
Single Service kitchen: Single serving with disposal	1.5 hours
Sand-silt-oil	2.0 hours
Lint-silt (laundry)	2.0 hours

Estimated Storage Factors		
Fully equipped commercial kitchen	8 hour operation:	1.0
	16 hour operation:	2.0
	24 hour operation	3.0
Single service kitchen		1.5
Auto washers	Self-serve	1.5
	Employee operated	2.0
Laundries, Laundromats	(allows for rock filter)	1.5

K 12 Inspection and Testing

(a) Private sewage disposal systems shall be inspected and tested prior to operation.

(b) Inspection shall be for the following purposes:

(1) To verify soil characteristics used for the basis of the design.

(2) To verify the installation of approved equipment and materials.

(3) To verify that construction was performed in accordance with the permit.

(4) To verify watertightness of the septic tank and other components.

(c) Field testing shall include:

(1) Septic tank watertightness - Watertightness shall be established before inspection. A tank failing the watertightness test must be repaired or replaced, and cannot be operated until it complies with watertightness requirements and has been inspected.

(2) Water test procedures - Tanks shall be filled to the invert of the outlet. Water shall be left standing in the tank for at least 24 hours before the inspection. After 24 hours, refill the tank, if necessary. Concrete may absorb some water. At the start of the inspection, record the initial water level and time. After one hour, record the time and the corresponding water level. A tank shall pass a watertightness test if the water level dropped less than 1/4 of an inch. A visible leak (flowing water) shall be considered a failure. A damp or wet spot that is not flowing is not considered a failure.

(3) Vacuum testing procedures - Vacuum testing may be used to determine watertightness in lieu of a water test. The tank shall be sealed and empty. A vacuum of 2" (5.1 cm) of mercury (1 psi or 69.1 gm/sq. cm) shall be applied and stabilized. The vacuum shall drop no more than 0.2" (0.5 cm) of mercury (0.1 psi or 6.9 gm/sq. cm) during the one hour test period.

(4) A flow test shall be performed through the system to the point of effluent disposal. All lines and components shall be watertight. Capacities, required air space, and fittings shall be in accordance with the provisions set forth in this appendix.

K 13 Abandoned Sewers and Sewage Disposal Facilities

(a) Every abandoned building (house) sewer, or part thereof, shall be plugged or capped in an approved manner within 5' (1.5 m) of the property line.

(b) Every cesspool, septic tank, alternative sewage disposal system, and seepage pit which has been abandoned or has been discontinued otherwise from further use or to which no waste or soil pipe from a plumbing fixture is connected, shall have the sewage removed therefrom, shall have all electrical and mechanical components disconnected and abandoned under the appropriate procedures in the uniform building or electrical code, as applicable, and be completely filled with earth, sand, gravel, concrete, or other approved material.

(c) The top cover or arch over the cesspool, septic tank, or seepage pit shall be removed before filling and the filling shall not extend above the top of the vertical portions of the sidewalls or above the level of any outlet pipe until inspection has been called and the cesspool, septic tank, or seepage pit has been

inspected. After such inspection, the cesspool, septic tank, or seepage pit shall be filled to the level of the top of the ground.

(d) No person owning or controlling any cesspool, septic tank, or seepage pit on the premises of such person or in that portion of any public street, alley, or other public property abutting such premises, shall fail, refuse, or neglect to comply with the provisions of this section or upon receipt of notice so to comply from the Authority Having Jurisdiction.

(e) Where disposal facilities are abandoned consequent to connecting any premises with the public sewer, the permittee making the connection shall fill all abandoned facilities as required by the Authority Having Jurisdiction within 30 days from the time of connecting to the public sewer.

K 14 Drawings and Specifications

The Authority Having Jurisdiction may require any or all of the following information before a permit is issued for a private sewage disposal system:

(1) A site specific plot plan drawn to scale, dimensioned, showing direction and approximate slope of surface (2’ (0.6 m) contour lines), location of all present or proposed retaining walls, drainage channels, water supply lines or wells, paved areas and structures on the plot, number of bedrooms or plumbing fixtures in each structure and location of the private sewage disposal system with relation to lot lines and structures.

(2) Details of construction including system profile and construction sections necessary to assure compliance with the requirements of this appendix together with a full description of the complete installation including specifications describing all materials, equipment, construction, workmanship, and methods of assembly and installation.

(3) A log of the soil formations, percentage of rock, texture, structure, consistence, and mottles as provided in ASTM D-5921-96, or other practice acceptable, and depth to the groundwater below the land surface as determined by established records or test holes dug in close proximity to any proposed seepage pit or disposal field, together with a statement of water absorption characteristics of the soil at the proposed site as determined by site investigation and soil evaluation.

K 15 Percolation Testing, Soil Absorption Rate and Minimum vertical separation

(a) The following procedures are to be used for determining the system soil absorption rate and minimum vertical separation:

(1) Establish the primary area based on site suitability review including proposed improvements.

(2) Establish the reserve area based on site suitability review and the type of system.

(3) Excavate the test hole to the depth necessary to confirm soil conditions for the design of the proposed disposal trench, bed or seepage pit. For disposal trenches and beds, a minimum of one test hole at both the primary disposal area and the reserve area is required. For seepage pits, one test hole is required at the primary disposal area.

(4) For disposal trenches and beds, testing shall be performed at appropriate locations and depths within the soil profile to determine the rate at which the soil will absorb effluent. Percolation tests should be performed at each obvious strata change that would significantly effect the design, soil application rate or minimum vertical separation.

(5) For seepage pits, discount the thickness of any relatively impermeable soil profiles while determining the soil absorption rate.

(6) A test hole shall not be excavated within 3’ (0.9 m) of a ledge in an observation pit. Care should be taken to assure adjacent features impacting the absorption rate are avoided.

(7) The test report shall include a site evaluation map locating the test hole(s).

(b) Disposal Trenches and Beds

(1) Area Preparation

(i) Dig a 12” square by 12” (30.5 cm x 30.5 cm) deep hole or a 15” round by 12” (38.1 cm x 30.5 cm) deep hole in undisturbed soil.

(ii) Scarify any smeared soil surfaces.

(iii) Remove loosened materials from the bottom of hole.

(2) Presoaking the Test Hole

(i) A system, such as a perforated bucket, can be used to support the sidewalls of the test hole if necessary. Fill any voids between the walls of the hole and the bucket with pea gravel.

(ii) Fill the test hole to 12” (30.5 m) above the bottom of the hole with clean water.

(iii)Observe the rate at which the water level drops in the hole and determine the time in minutes for the water to completely drain away.

(iv) If the water drains away in less than 60 minutes, repeat the procedure. If the water drains away in less than an additional 60 minutes, repeat the procedure a third time.

(v) Proceed immediately with testing if the water drains away three times in less than 60 minutes each time.

(vi) If the water does not drain after the third refill, maintain the water level in the test hole at a minimum depth of 9” (22.9 cm) for at least four hours. Wait for a minimum of 16 hours and a maximum of 24 hours before proceeding with the test.

(3) Conducting the Test

(i) Remove any materials that have sloughed into the test hole to be sure that the test hole has the dimensions indicated above.

(ii) Fill the hole with clean water to a depth of 6” (15.2 cm) above the bottom of the percolation test hole.

(iii) Measure the time it takes for the water level to drop exactly 1” (2.5 cm) from a fixed reference point. Record the drop in the water level. Care should be used to be sure that the measurement method does not have a significant impact on determination of the absorption rate.

(iv) Determine the stabilized absorption rate for the test hole. The approximate absorption rate can be determined by repetitively measuring the absorption rate until three consecutive values vary by no more than 10%. If three consecutive measurements indicate that the absorption rate is not approaching a steady rate or that the rate is close to a restrictive limit, an alternate

method based on a graphical solution of the test data approximating the final stabilized rate is recommended.

(v) Record the test rate based on the above procedure.

(c) Seepage Pits

(1) Area Preparation

(i) Drill a test hole at least 18” (45.7 cm) in diameter to the depth of the bottom of the proposed seepage pit. The minimum hole depth is 30’ (9.1 m). After the test, the diameter of the test hole may be enlarged to allow construction of the seepage pit at the same location.

(ii) Scarify any smeared soil surfaces.

(iii) Remove loosened materials from the bottom of the hole.

(2) Presoaking the Test Hole

(i) Fill the bottom 6” (15.2 cm) of the test hole with gravel, if necessary, to prevent scouring.

(ii) Fill the test hole with clean water up to 3’ (0.9 m) below grade.

(iii) Observe the rate at which the water level drops in the hole and determine the time in minutes for the water to completely drain away.

(iv) If the water drains away in less than four hours, repeat the procedure.

(v) Proceed immediately with testing if the water drains away in less than four hours after the second refill.

(vi) If the water does not drain within four hours after the second refill, refill the hole a third time and wait for a minimum of 16 hours and a maximum of 24 hours before proceeding with the test.

(vii) If there is still standing water in the hole after the presoaking has been completed, the water shall not be removed from the hole.

(3) Conducting the Test

(i) Fill the hole with clean water up to 3’ (0.9 m) below grade.

(ii) Measure the decline of the water level from a fixed reference point every 10 minutes until a stabilized absorption rate is obtained.

(iii) Determine the stabilized absorption rate by repetitively measuring the absorption rate until three consecutive values vary by no more than 10%. If three consecutive measurements indicate that the absorption rate is not approaching a steady rate or that the rate is close to a restrictive limit, an alternate method based on a graphical solution of the test data approximating the final stabilized rate is recommended.

(iv) Do not use test results from any relatively impermeable soil profiles while determining the stabilized soil absorption rate.

(v) Record the rate based on the above procedure.

Table K-1. Location of Sewage Disposal System

Point of Beginning for Setback Distance	Minimum Horizontal Setback Distances in feet (meters)	
	Septic Tank	Disposal Trench/Bed or Seepage Pit
Buildings (see footnote 1)	10 (3.0)	10 (3.0)
Property line adjoining private property	5 (1.5)	See footnote 2
Well (Public Water Supplies)	100 (30.5)	100 (30.5)
Wells (Private) (see footnote 3)	100 (30.5)	100 (30.5)
Live Streams (see footnote 4)	100 (30.5)	100 (30.5)
Lake or Reservoir (see footnote 5)	100 (30.5)	100 (30.5)
Domestic Water Source Intake	200 (61.0)	200 (61.0)
Dry Wash/Drainage Easement (see footnote 6)	50 (15.2)	50 (15.2)
Transmission Distribution Water Line	10 (3.0)	10 (3.0)
Domestic service Water Line (see footnote 7)	5 (1.5)	5 (1.5)

Cut on Sloping downgradient Terrain, Culverts and Roadway Ditches (see footnote 8)	15 (4.6)	15 (4.6) or 4 x the elevation difference between the finished grade at the point of beginning and the elevation at the cut bank bottom, ditch bottom, or culvert invert, whichever is greater, up to 50 feet (15.2 m)
Driveway (see footnote 9)	5 (1.5)	5 (1.5)
Swimming Pool (see footnote 10)	5 (1.5)	5 (1.5)
Any Easements (other than drainage easements) (see footnote 11)	5 (1.5)	5 (1.5)

Footnotes:

1 Including porches, decks and steps, whether covered or uncovered, breezeways, roofed patios, carports, covered walks, covered driveways, swimming pools, and similar structures and appurtenances.

2 The setback requirement is 5’ (1.5 m) unless the property is not served by a central system for the distribution of water and:

(a) There is no existing or proposed individual well on adjoining private property, in which case the setback is 50’ (15.2m); or

(b) A 100’ (30.5m) separation distance cannot be maintained from an existing or proposed individual well, in which case the setback is the distance necessary to maintain the 100’ (30.5m) separation; or

(c) The applicable setback requirement in (a) or (b) may be reduced to a minimum of 5’ (1.5m) with a variance from the Authority Having Jurisdiction.

3 For unaltered lots in a subdivision approved before October 1, 1986.

4 Measured from the nearest boundary of peak streamflow from a 10 year 24 hour precipitation event.

5 Measured from the elevation of high water line from a peak flow from a 10 year, 24 hour precipitation event at the spillway.

6 Fifty foot (15.2 m) setback is measured from the edge of the defined natural channel bank of a drainage area of more than five acres or a drainage easement whichever is less. Setback may be reduced to 25' (7.6 m) up gradient from the system, if channel erosion protection is provided (naturally or man-made) and approved by the Authority Having Jurisdiction.

7 Water pipes crossing or adjacent to sewer or drainage piping constructed of clay or materials that are not approved for use within a building shall be laid a minimum of 12" (30.5 cm) from the sewer or drain pipe.

8 Measure the setback from the outside of the private sewage disposal system component to the top of the cut bank or ditch, or to the nearest sidewall of a culvert.

9 Measured from the edge of the driveway to the nearest edge of septic tank excavation. A properly reinforced septic tank and cover may be placed at any location relative to a driveway if access openings, risers, and covers carry the design load and are protected from inflow.

10 Setback may be increased due to soil loading and stability concerns.

11 Five feet (1.5 m) minimum unless other setback requirements govern.

Table K-2. Design liquid capacity (size) of septic tanks

No. of Bedrooms	No. of Occupants	No. of Baths	Maximum Fixture Count	Recommended Septic Tank Size in Gallons (L)	Minimum Septic Tank Size in Gallons (L) (+ or - 5%)
2	4	1	12	1000 (3785)	1000 (3785)
2	4	2	18	1000 (3785)	1000 (3785)
3	6	1	18	1250 (4731)	1000 (3785)
3	6	2	18	1250 (4731)	1000 (3785)
4	8	2	24	1500 (5678)	1250 (4731)
4	8	3	25	1500 (5678)	1250 (4731)
5	10	2	30	2000 (7570)	1500 (5678)
5	10	3	30	2000 (7570)	1500 (5678)

5	10	4	32	2000 (7570)	1500 (5678)
6	12	3	36	2500 (9463)	2000 (7570)
6	12	4	36	2500 (9463)	2000 (7570)
6	12	5	39	2500 (9463)	2000 (7570)
7	14	3	42	2500 (9463)	2000 (7570)
7	14	4	42	2500 (9463)	2000 (7570)
7	14	5	42	2500 (9463)	2000 (7570)

Table K-3. Estimated Waste/Sewage Flow Rates

Because of the many variables encountered, it is not possible to set absolute values for waste/sewage flow rates for all situations. The designer should evaluate each situation and, if figures in this table need modification, they should be made with the concurrence of the Authority Having Jurisdiction.

Type of Occupancy	Gallons (Liters) Per Day
1. Airports	15 (56.7) per employee 5 (18.9) per passenger
2. Auto Washers	Per manufacturer's specification
3. Bowling Alleys (snack bar only)	75 (283.9) per lane
4. Camps	
Campground with central comfort station	35 (132.4) per person
With flush toilets, no showers	25 (94.6) per person
Day camps (no meals served)	15 (56.7) per person
Summer and seasonal	50 (189.2) per person
5. Churches (Sanctuary)	5 (18.9) per seat
With kitchen waste	7 (26.4) per seat
6. Dance halls	5 (18.9) per person

7. Factories	
No showers	25 (94.6) per employee
With showers	35 (132.4) per employee
Cafeteria, add	5 (18.9) per employee
8. Hospitals	250 (946.3) per bed
Kitchen waste only	25 (94.6) per bed
Laundry waste only	40 (151.4) per bed
9. Hotels	
With kitchen	60 (227.1) per bed (2 person)
Without kitchen	50 (189.2) per bed (2 person)
10. Institutions (Resident)	75 (283.9) per person
Nursing home	125 (473.1) per person
Rest home	125 (473.1) per person
11. Laundries, self service (minimum 10 hours per day)	50 (189.2) per wash cycle
Commercial	Per manufacturer's specification
12. Motel	
With kitchen	60 (227.1) per bed (2 person)
Without kitchen	50 (189.2) per bed (2 person)
13. Offices	20 (75.7) per employee
14. Parks	
Mobile homes	250 (946.3) per parking space
Picnic parks (toilets only)	20 (75.7) per parking space
Recreational vehicles -	
Without water or sewer hook-up	75 (283.9) per parking space
With water and sewer hook-up	100 (378.5) per parking space

15. Restaurants - cafeterias	20 (75.7) per employee
Toilet	7 (26.4) per customer
Kitchen waste	6 (22.7) per meal
Garbage disposal	1 (3.7) per meal
Cocktail lounge	2 (7.5) per customer
Kitchen waste -	
Disposal service	2 (7.5) per meal
16. Schools - Staff and office	20 (75.7) per person
Elementary	15 (56.7) per student
Middle and high	20 (75.7) per student
With gym and showers, add	5 (18.9) per student
With cafeteria, add	3 (11.3) per student
Boarding, total waste	100 (378.5) per person
17. Service station, toilets	1000 (3785.4) for first bay 500 (1892.7) for each additional bay
18. Stores	20 (75.7) per employee
Public restrooms, add	1 per 10 sq. ft. of floor space (3.79 per 9290.3 sq. cm of floor space)
19. Swimming pools, public	10 (37.8) per person
20. Theaters, auditoriums	
Indoor	5 (18.9) per seat
Drive-in	10 (37.8) per space
21. Single Family Residential Dwellings	150 (567.7) per bedroom or 25 (94.6) per fixture unit whichever is greater
22. For structures and facilities not specifically addressed in the above table, flow rates available from other standard books and literature may be approved.	

(a) Recommended Design Criteria. The size of the sewage disposal system components, for uses other than a single family residential dwelling, is calculated as follows:

For waste/sewage flow, up to 3000 gallons/day (11,355 liters/day)

Design Flow = The total of the estimated flow rates from Table K-3

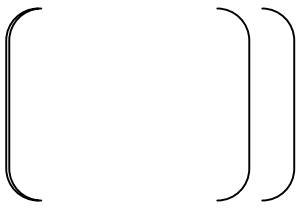
Septic tank size = design flow x 2.1.

(b) Also see Section K 3 of this appendix.

(c) Additional treatment of sewage is required if sewage quality exceeds 430 milligrams/liter for total suspended solids, 380 milligrams/liter for the five-day biochemical oxygen demand, 75 milligrams/liter for fats, oils, and greases, or the sewage includes wastes other than those originating from domestic toilet flushing, food preparation, non-occupational laundry, or personal hygiene, or wastes originating from an operation using any hazardous substance or creating a hazardous waste as defined in the statutes or rules of the Arizona Department of Environmental Quality.

Table K-4 (A). Soil Absorption Rate and Minimum Vertical Separation for Shallow Disposal Field Systems by Soil Evaluation Method (see footnote 1)

Instructions: Read questions in the following table beginning with row A. The first "yes" response from columns a or b determines the maximum soil absorption rate.

	A Soil Absorption Rate in gallons per day (gpd) per sq. ft. liters per day (lpd) sq. m	B Soil Absorption Rate in sq. ft. per 100 gallons per day (gpd) sq. m. per 100 liters per day (lpd)
A. Is the horizon gravelly coarse sand or coarser?	0 (0)	0 (0)
B. Is the structure of the horizon moderate or strongly platy?	0 (0)	0 (0)

C. Is the texture of the horizon sandy clay loam, clay loam, silty clay loam, or finer and structure weak platy?	0 (0)	0 (0)
D. Is the moist consistence stronger than firm or any cemented class?	0 (0)	0 (0)
E. Is texture sandy clay, clay, or silty clay of high clay content and structure massive or weak?	0 (0)	0 (0)
F. Is texture sandy clay loam, clay loam, silty clay loam, or silty loam and structure massive?	0 (0)	0 (0)
G. Is the texture of the horizon loam or sandy loam and the soil structure massive?	.20 (8.15)	500 (12.3)
H. Is texture sandy clay, clay, or silty clay of low clay content and the structure moderate or strong?	.20 (8.15)	500 (12.3)
I. Is texture sandy clay loam, clay loam, or silty clay loam and structure weak?	.20 (8.15)	500 (12.3)
J. Is texture sandy clay loam, clay loam, or silty clay loam and structure moderate or strong?	.40 (16.30)	250 (6.1)
K. Is texture sandy loam, loam, or silty loam and structure weak?	.40 (16.30)	250 (6.1)
L. Is texture sandy loam, loam, silt loam and structure moderate or strong?	.60 (24.45)	166.7 (4.1)
M. Is texture fine sand, very fine sand, loamy fine sand, or loamy very fine sand?	.40 (16.30)	250 (6.1)
N. Is texture loamy sand or sand?	.80 (32.59)	125 (3.1)
O. Is texture coarse sand? (see footnote 2)	1.20 (48.89)	83.3 (2.0)

Footnotes:

1 Shallow trench and bed systems are less than 5’ (1.52 m) deep and shall have a minimum vertical separation of 4’ (1.22 m) to rock, fractured rock, soils with greater than 50% rock fragments and a 5’ (1.52 m) zone of unsaturated soil to groundwater.

2 Shallow trench and bed systems are less than 5’ (1.52 m) deep and shall have a minimum vertical separation of 10’ (3.04 m) to rock, fractured rock, soils with greater than 50% rock fragments and a 10’ (3.04 m) zone of unsaturated soil to groundwater.

Example:

Three-bedroom dwelling, wastewater flow rate = 450 gpd (1,703 lpd), soil texture is loamy sand (N).

Using Column A - Effective Area = Divide the flow rate (450 gpd) (1,703 lpd) by the soil application rate of 0.8 gpd/sq. ft. (32.6 lpd/sq. m.)

Effective Area = 450/0.8 = 562.5 sq. ft. (1,703/32.6 = 52.3 sq. m.).

Using Column B - Effective Area = Multiply the flow rate (450 gpd) (1,703 lpd) by the soil application rate of 125 sq. ft./100 gpd (3.1 sq. m./100 lpd)

Effective Area = 450x125/100 = 562.5 sq. ft. (3.1 x 1,703/100 = 52.3 sq. m.).

Table K-4 (B). Soil Absorption Rate and Minimum Vertical Separation for Deep Disposal Field Systems by Soil Evaluation Method (see footnote)

Instructions: Read questions in the following table beginning with row A. The first "yes" response from columns A or B determines the maximum soil absorption rate.

	A Soil Absorption Rate in gallons per day (gpd) per sq. ft. liters per day (lpd) sq. m	B Soil Absorption Rate in sq. ft. per 100 gallons per day (gpd) sq. m. per 100 liters per day (lpd)

A. Is the horizon gravelly coarse sand or coarser?	0 (0)	0 (0)
B. Is the structure of the horizon moderate or strongly platy?	0 (0)	0 (0)
C. Is the texture of the horizon sandy clay loam, clay loam, silty clay loam, or finer and structure weak platy?	0 (0)	0 (0)
D. Is the moist consistence stronger than firm or any cemented class?	0 (0)	0 (0)
E. Is texture sandy clay, clay, or silty clay of high clay content and structure massive or weak?	0 (0)	0 (0)
F. Is texture sandy clay loam, clay loam, silty clay loam, or silty loam and structure massive?	0 (0)	0 (0)
G. Is the texture of the horizon loam or sandy loam and the soil structure massive?	.13 (5.3)	769 (18.9)
H. Is texture sandy clay, clay, or silty clay of low clay content and the structure moderate or strong?	.13 (5.3)	769 (18.9)
I. Is texture sandy clay loam, clay loam, or silty clay loam and structure weak?	.13 (5.3)	769 (18.9)
J. Is texture sandy clay loam, clay loam, or silty clay loam and structure moderate or strong?	.27 (11.0)	370.4 (9.1)
K. Is texture sandy loam, loam, or silty loam and structure weak?	.27 (11.0)	370.4 (9.1)
L. Is texture sandy loam, loam, silt loam and structure moderate or strong?	.40 (16.3)	250 (6.1)
M. Is texture fine sand, very fine sand, loamy fine sand, or loamy very fine sand?	.27 (11.0)	370.4 (9.1)
N. Is texture loamy sand or sand?	.53 (21.6)	188.7 (4.6)
O. Is texture coarse sand?	0 (0)	0 (0)

Footnote:

Deep trench systems are greater than or equal to 5’ (1.52 m) and less than 10’ (3.0 m) deep and shall have a minimum vertical separation of 5’ (1.52 m) to rock, fractured rock, soils with greater than 50% rock fragments and a 5’ (1.52 m) zone of unsaturated soil to groundwater.

Example:

Three-bedroom dwelling, wastewater flow rate = 450 gpd (1,703 lpd), soil texture is loamy sand (N).

Using Column A - Effective Area = Divide the flow rate (450 gpd) (1,703 lpd) by the soil application rate of 0.53 gpd/sq. ft(21.6 lpd)

Effective Area = 450/0.53 = 849 sq. ft. (1,703/21.6 = 78.8 sq. m.).

Using Column B - Effective Area = Multiply the flow rate (450 gpd) (1,703 lpd) by the soil application rate of 188.7 sq. ft./100 gpd(4.6 sq. m./100 lpd)

Effective Area = 450x188.7/100 = 849 sq. ft. (4.6 x1,703/100) = 78.3 sq. m.).

Table K-5. Soil Absorption Rate and Minimum Vertical Separation for Seepage Pits

Soil Characteristics	Percolation Test Rate Range	Maximum Soil Absorption Rate	Minimum Vertical Separation to Groundwater	
			Gravel Seepage Pit	Lined Seepage Pit
	minutes per inch (minutes per cm)	gpd/sq. ft. (lpd/sq. m.)	ft (m)	ft (m)
Gravelly Coarse Sands	less than 1.00 (0.39)	greater than 1.20 (48.9) NOT PERMITTED	-	-
Coarse to Medium to Fine Sands	1.00 to less than 2.00 (0.39 to less than 0.78)	1.20 (48.9)	60 (18.3)	60 (18.3)

Medium to Fine Sands and Silty Sands	2.00 to less than 3.00 (0.78 to less than 1.18) 3.00 to less than 4.00 (1.18 to less than 1.57) 4.00 to less than 5.00 (1.57 to less than 1.96) 5.00 to less than 6.00 (1.96 to less than 2.75)	1.10 (44.8) 1.00 (40.7) 0.90 (36.7) 0.75 (30.6)	60 (18.3) 60 (18.3) 60 (18.3) 60 (18.3)	60 (18.3) 60 (18.3) 60 (18.3) 60 (18.3)
Fine to Very Fine sands and Loamy Sands	7.00 to less than 10.00 (2.75 to less than 3.93)	0.63 (25.7)	25 (7.6)	25 (7.6)
Sandy to Silty Loams, loam	10.00 to less than 15.00 (25.4 to less than 38.1) 15.00 to less than 20.00 (38.1 to less than 50.8) 20.00 to less than 25.00 (50.8 to less than 63.5) 25.00 to less than 30.00 (63.5 to less than 76.2)	0.50 (20.4) 0.44 (17.9) 0.40 (16.3) 0.36 (14.7)	25 (7.6) 25 (7.6) 25 (7.6) 25 (7.6)	25 (7.6) 25 (7.6) 25 (7.6) 25 (7.6)
Strongly Structured Loams and Clayey Soils	greater than 30.00 (76.2)	less than .36 NOT PERMITTED	-	-

(a) Seepage pits shall be bored 5’ (1.5 m) deeper than the proposed pit depth to verify underlying soil characteristics, unless water table evidence or bedrock is encountered sooner. The 5’ (1.5 m) of overdrill shall then be backfilled with low permeability drill cuttings or other suitable material.

(b) Seepage pits that terminate in gravelly, coarse sand stratas shall be backfilled 5’ (1.5 m) above the beginning of such strata with low permeability drill cuttings or other suitable material.

Table K-6. Seepage Pit Effective Absorption Area

Effective Strata Depth Below Flow Line	Seepage Pit Effective Absorption Area, sq. ft. (sq. m.)		
	Diameter of Seepage Pit		
ft (m)	4’ (1.2 m)	5’ (1.5 m)	6’ (1.8 m)
1 (0.3)	13 (1.2)	16 (1.5)	19 (1.8)
2 (0.6)	25 (2.3)	31 (2.9)	38 (3.5)
3 (0.9)	38 (3.5)	47 (4.4)	57 (5.3)
4 (1.2)	50 (4.6)	63 (5.9)	75 (7.0)
5 (1.5)	63 (5.9)	79 (7.3)	94 (8.7)
6 (1.8)	75 (7.0)	94 (8.7)	113 (10.5)
7 (2.1)	88 (8.2)	110 (10.2)	132 (12.3)
8 (2.4)	100 (9.3)	126 (11.7)	151 (14.0)
9 (2.7)	113 (10.5)	141 (13.1)	170 (15.8)
10 (3.0)	126 (11.7)	157 (14.6)	189 (17.6)
20 (6.l)	251 (23.3)	314 (29.2)	377 (35.0)
30 (9.1)	377 (35.0)	471 (43.8)	566 (52.6)
40 (12.2)	502 (46.6)	628 (58.3)	754 (70.0)
50 (15.2)	628 (58.3)	785 (72.9)	943 (87.6)

(a) Minimum Effective Depth of Pit = 10’ (3.0 m).

(b) Sufficient area shall be provided for at least two bedrooms.

(c) Effective absorption surface for seepage pits includes sidewall areas only.

Table K-7. Soil Absorption Rate and Minimum Vertical Separation for Disposal Field Systems by Percolation Test Results

Percolation Rate from Percolation Test minutes per in (minutes per cm.)	Shallow Disposal Field System (see footnote 2) Soil Absorption Rate gpd/sq. ft. (lpd/sq. m.)	Deep Disposal Field System (see footnote 3) Soil Absorption Rate gpd/sq. ft. (lpd/sq. m.)	Minimum Vertical Separation (see footnote 4) ft (m)

less than 1.00	Note 1	Note 1	Note 1
l.00 to less than 3.00 (1.18)	1.20 (48.9)	0.93 (37.9)	40.0 (12.2)
3.00 (1.18)	1.10 (44.8)	0.73 (29.7)	10.0 (3.0)
4.00 (1.57)	1.00 (40.7)	0.67 (27.3)	10.0 (3.0)
5.00 (1.97)	0.90 (36.7)	0.60 (24.4)	10.0 (3.0)
7.00 (2.76)	0.75 (30.6)	0.50 (20.4)	10.0 (3.0)
10.0 (3.94)	0.63 (25.7)	0.42 (17.1)	10.0 (3.0)
15.0 (5.91)	0.50 (20.4)	0.33 (13.4)	5.0 (1.5)
20.0 (7.87)	0.44 (17.9)	0.29 (11.8)	5.0 (1.5)
25.0 (9.84)	0.40 (16.3)	0.27 (11.0)	5.0 (1.5)
30.0 (11.81)	0.36 (14.7)	0.24 (9.8)	5.0 (1.5)
35.0 (13.78)	0.33 (13.4)	0.22 (9.0)	5.0 (1.5)
40.0 (15.75)	0.31 (12.6)	0.21 (8.6)	5.0 (1.5)
45.0 (17.72)	0.29 (11.8)	0.20 (8.1)	5.0 (1.5)
50.0 (19.68)	0.28 (11.4)	0.19 (7.7)	5.0 (1.5)
55.0 (21.65)	0.27 (11.0)	0.18 (7.3)	5.0 (1.5)
more than 55.0 to 60.0 (21.65 to 23.62)	0.25 (10.2)	0.17 (6.9)	5.0 (1.5)
more than 60.0 to 120 (23.62 to 47.24)	0.20 (8.1)	0.13 (5.3)	5.0 (1.5)

Footnotes:

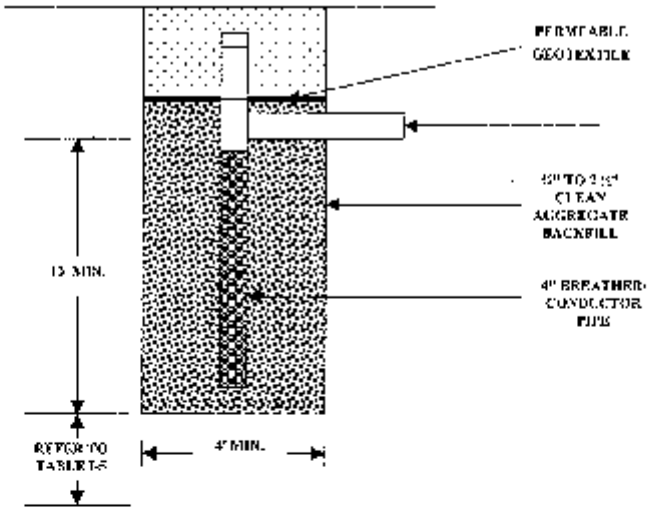
1 Not permitted for septic tank effluent.

2 Depth of bottom of disposal field below finished grade of soil is less than 5.00 feet (1.5 m).

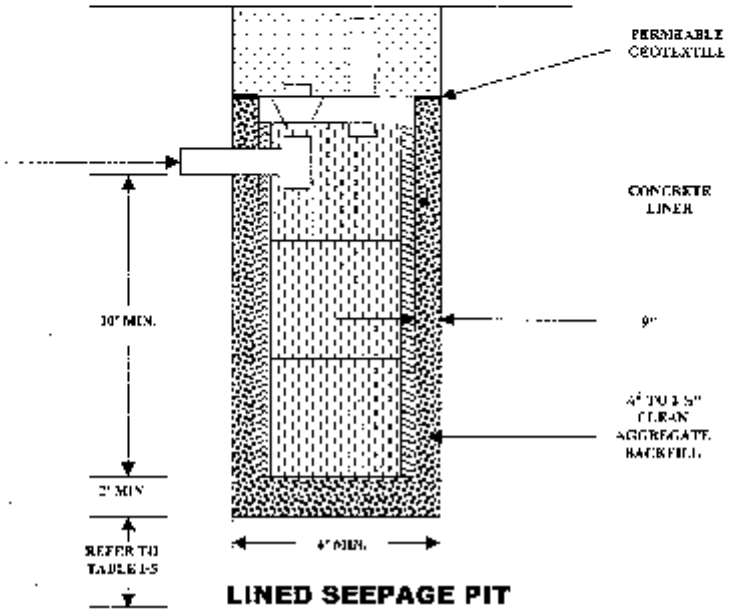
3 Depth of bottom of disposal field below finished grade of soil is 5.00 feet (1.5 m) or greater.

4 Minimum vertical distance required for achieving unsaturated flow is measured from the bottom of a constructed disposal field to the nearest restrictive soil condition including, but not limited to, the seasonal high water table capillary fringe, impermeable layer, rock, fractured rock, soils with greater than 50% rock fragments, and unacceptable soil.

SEEPAGE PIT DESIGN



GRAVEL FILLED SEEPAGE PIT



LINED SEEPAGE PIT

FIGURE I-1

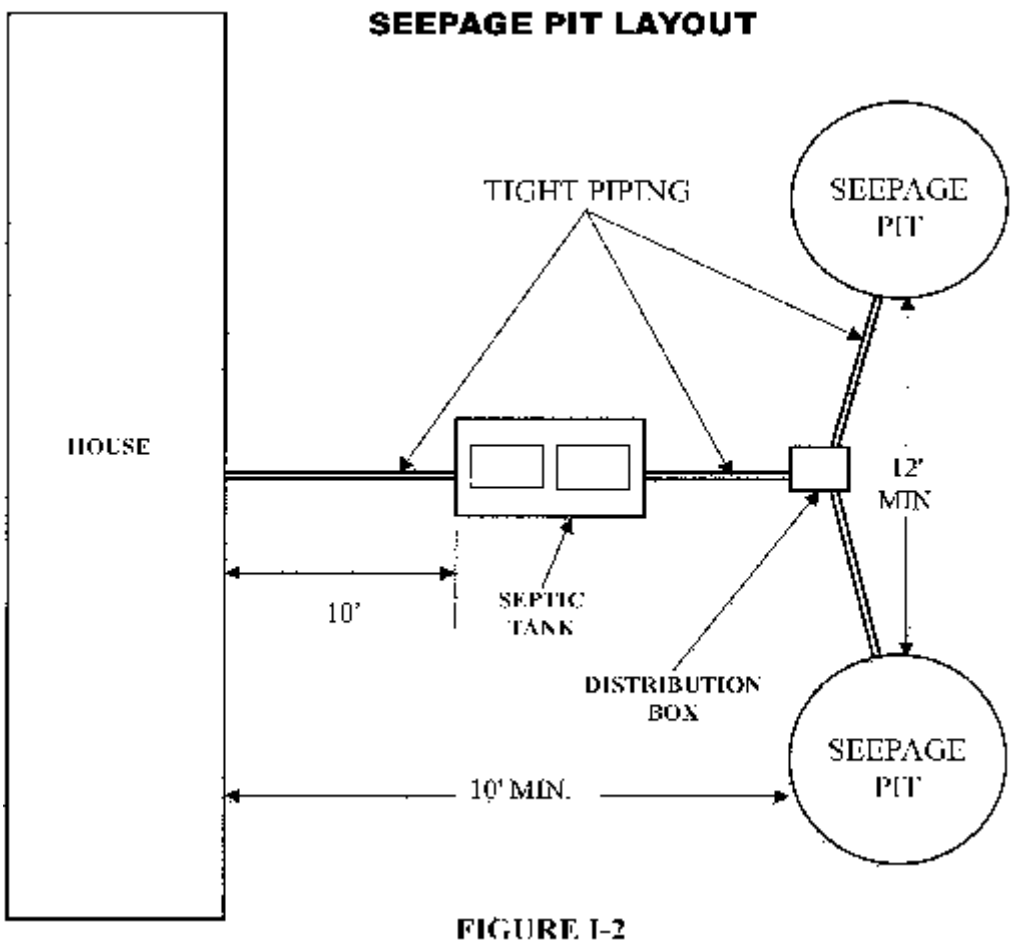


FIGURE I-2

ARTICLE 3 INSTALLATION STANDARDS

R4-48-301. Non-Metallic Building Sewers

This standard has no modifications.

R4-48-302. Tile-lined Roman Bathtubs

This installation standard has no modifications.

R4-48-303. Copper Plumbing Tube, Pipe, and Fittings

This installation standard has no modifications.

R4-48-304. Tile-lined Shower Receptors (and Replacements)

This installation standard has no modifications.

R4-48-305. ABS Building Drain, Waste, and Vent Pipe and Fittings

This installation standard has no modifications.

R4-48-306. Hubless Cast-Iron Sanitary and Rainwater Systems

This installation standard has no modifications.

R4-48-307. Polyethylene (PE) Cold-Water Building Supply and Yard Piping

This installation standard has no modifications.

R4-48-308. PVC Cold Water Building Supply and Yard Piping

This installation standard has no modifications.

R4-48-309. PVC Building Drain, Waste and Vent Pipe and Fittings

This installation standard has no modifications.

R4-48-310. ABS Sewer Pipe and Fittings

This installation standard has no modifications.

R4-48-311. Polyethylene (PE) for Gas Yard Piping

This installation standard has no modifications.

R4-48-312. Protectively Coated Pipe

This installation standard has no modifications.

R4-48-313. Asbestos Cement Pressure Pipe for Water Service and Yard Piping

This installation standard has no modifications.

R4-48-314. Low-Pressure Air Test for Building Sewers

This installation standard has no modifications.

R4-48-315. Extra-Strength Vitrified Clay Pipe in Building Drains

This installation standard has no modifications.

R4-48-316. CPVC Solvent-Cemented Hot and Cold Water Distribution Systems

This installation standard has no modifications.

R4-48-317. Welded Copper and Copper Alloy Water Tube

This installation standard has no modifications.

R4-48-318. Trenchless Polyethylene (PE) Pipe for Sewer Laterals

This installation standard has no modifications.

R4-48-319. Odor Control Systems for Water Closets

This installation standard has no modifications.

R4-48-320. Composite PEX-AL-PEX Hot and PE-AL-PE Cold Water Distribution Systems

This installation standard has no modifications.